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THE STUDENT.

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MY HISTORIC PENNY.

J. FRAISE RICHARD.

IN my pocket is an English penny bearing the date of 1776. Let us see what can be learned from it.

It was, in October, 1885, dug up by some curiosity seekers from the site on which stood the cabin in which James Buchanan was born. The cabin in question stood by the side of a packer's path which led from Cumberland valley in Southern Pennsylvania across North Mountain into Western Pennsylvania, and along which the pioneers moved in piercing the dense forests and districts then lying toward the setting sun. The particular place was a cove in the mountain known as "Stony batter," in Franklin County, distant three miles and a half from what is now Mercersburg, a village famous for its picturesque situation and literary history. The cove is a romantic place, its pines and other evergreens, its huge rocks from which burst forth living streams of purest water, its natural murmurs and the music of wild birds, its wild flowers of infinite variety, its refreshing shades and numberless precious memories all combining to make it the abode which the gods would seek. From its overhanging mountains in the west, hordes of fierce savages were accustomed to look with jealous eye upon the encroaching column of westward moving civilization. Between its mighty walls went forth the cruel warrior as he led his dusky comrades to the slaughter of defenseless and unsuspecting women and children in pioneer times; and within sight of its surrounding walls passed the mighty army of Lee when Pennsylvania was invaded in 1863, and at other times.

At the time this penny was coined, George the Third was King of England. He was the son of Frederic, Prince of Wales, and was born in London, June 4, 1738, and succeeded to the English throne in 1760. He was well educated, and strongly attached to the institutions of his country. He was conscientious in the discharge of his duties, and a firm patron of morality and religion as he understood them. In these respects his career contrasted strangely with those of his two immediate predecessors

and two successors. His mind was sluggish. He was obstinate and crafty, revengeful and unrelenting to his enemies, and strangely partial to his political friends. His reign of sixty years was filled with stirring events, among which may be mentioned: The Spanish war of 1762-3; Wilkes Controversy, 1762-82; Passage of American Stamp Act, 1765; Publication of the Celebrated Junius letters, 1768-72; American Revolution 1775-83; Fox and North Coalition, 1783; French Revolution, 1789; Irish Rebellion, 1798; and Napoleonic wars.

In 1810 he became insane for the fifth and last time; the following year blind; and the Prince of Wales became Regent. He died at Windsor on January 29, 1820. His was a memorable reign.

The important event which occurred in this country during the year in which this coin was made was the signing, in the City of Philadelphia, of the Declaration of Independence. In this important document, which should be read by every teacher and pupil in the land, the denunciations of King George are terrifically severe.

Another important personage connected with the history of this penny was James Buchanan, who became fifteenth President of the United States. He was born in the little cabin referred to, April 23, 1791, and for some six or seven years lived there amid the wilderness and simplicity of the dell. So great was the danger of his becoming lost among the rocks and trees that surrounded the cabin, that his mother fastened a bell around his neck. He literally ran wild. Six years later this rural happiness was abridged by the romoval of the family to the village of Mercersburg: and some thirty-five years later the little cabin, a round-log, one story and a half structure, 20 by 21½ feet in size, was also removed to the village where it may be still seen on an obscure street occupied by people in very indigent circumstances.

James graduated at Dickinson College in 1809; studied law, and was admitted to the bar in Lancaster, in 1812; was a member of the State Legislature; served in Congress and the Senate of the United States for ten years each; was a minister to Russia and England; served as Secretary of State, and was President from March 4, 1857 to March 4, 1861. He died at his home near Lancaster, in 1868.

The site of his birth is a wild cove, wholly unmarked by the least effort at remembrance, the lofty pines, the lonely rocks, the dewy grass, the lovely wild flowers, and the silent stars of midnight being the only reminders of the sacredness of the place.

One other character is associated with this coin. Grover Cleveland, also President of the United States. He was born in Caldwell, Essex County, N.Y., March 18, 1837. Receiving a common school education he went at the age of 17, to Buffalo, and began the study of law with Rogers, Brown and Rogers.

In 1859 he was admitted to practice, and became, in 1863, assistant District Attorney for Erie County. In the autumn of 1870, he was elected Sheriff of his county, and held the place for three years. In 1881 he was chosen Mayor of Buffalo, and in 1882 was elected Governor of New York by a majority of 192,000 over Charley J. Folger, President Arthur's Secretary of the Treasury. By the National Democratic Convention he was nominated for President July 11, 1884, and elected over James G. Blaine Nov. 4, 1884. He was renominated at

St. Louis, June 6, 1888, but was defeated November 6, by Benjamin Harrison.

When this penny was coined the United States contained but thirteen colonies with a population of about three millions of people, and no established capital. There were no steamboats, no railroads, no telegraphs, no reapers, mowers or threshing machines, and for about six years afterward, there was not a daily paper in the United States.

HOW LONG CAN THE EARTH SUSTAIN LIFE?

SIR ROBERT BALL.

(In Two Parts. Part I.)

I KNOW that in the present day there are many who seem to think that hardly any boundaries can be assigned to the resources of a reasoning being. I have heard that when King Hudson in the zenith of his fame was asked as to what his railways were to do when all the coal was burned out, he replied that by that time we should have learned how to burn water. Those who are asked the same question now, will often reply that they will use electricity, and doubtless think that they have thus disposed of the question. The fallacy of such answers is obvious. A so-called "water gas" may no doubt be used for developing heat, but it is not the water which supplies the energy. Trains may be run by electricity, but all that the electricity does is to convey the energy from the point where it is generated to the train which is in motion. Electricity is itself no more a source of power than is the rope with which a horse drags a boat along the canal. There is much more philosophy in the old saying, "Money makes the mare to go," than in the optimistic doctrine we often hear spoken of with regard to the capacity of man for dealing with nature. The fact is that a very large part of the boasted advance of civilization is merely the acquisition of an increased capability of squandering. For what are we doing every day but devising fresh appliances to exhaust with ever greater rapidity the hoard of coal. There are just a certain number of tons of coal lying in the earth, and when these are gone there can be no more forthcoming. There is no manufacture of coal in progress at the present time. The useful mineral was the product of a very singular period in the earth's history, the like of which has not again occurred in any noteworthy degree in the geological ages which have since run their course. Our steam-engines are methods of spending this hoard; and what we often hear lauded as some triumph in human progress is merely the development of some fresh departure in a frightful extravagance. We would justly regard a man as guilty of expending his substance wastefully if he could not perform a journey without a coach-and-six and half-a-dozen out-riders, and yet we insist that the great steamers which take us across the Atlantic shall be run at a speed which requires engines, let us say, of 12,000 horse-power. If the number of passengers on such a vessel be set down as 500, we have for each

passenger the united force of 24 horses, night and day, throughout the voyage. I expect our descendants will think that our coal cellars have been emptied in a very wasteful manner, particularly when they reflect that if we had been content with a speed somewhat less than that at present demanded the necessary consumption of coal would have been reduced in a far greater proportion than the mere alteration of speed would imply.

Of course, no one will contend that the exhaustion of coal means the end of the human race ; man lived here for tens of thousands of years before he learned how to use coal. There may be a sort of Chinese-like civilization quite compatible with the absence of mineral fuel, at all events in regions where the climate is tolerably mild. We must also remember, as Professor Crookes has so forcibly pointed out, in a recent article, that there are vast stores of energy available elsewhere. The radiation from the sun, if it could be suitably garnered up and employed both directly as heat and indirectly as a source of power, would be quite capable of supplying all conceivable wants of humanity for ages. It is also to be noted that we live on the outside of a globe the inside of which is filled with substances that appear, from all we can learn, to have a temperature not less than that of molten iron. If the crust could be pierced sufficiently far, vast indeed is the quantity of heat that might be available. We see the operation of tapping the internal heat going on in nature. Every volcanic outbreak, every spring of hot water, every geyser are but indications of the internal heat of our globe. It may indeed be hard to see how a practical method for drawing on this vast reserve of heat can be devised, but it is at least conceivable that it may be rendered available when the coal and other more accessible sources have become exhausted, or even when their yield has considerably lessened.

The coal in the various parts of the globe may supply our cellars for a few centuries, but the exhaustion of this truly marvellous product is proceeding at an accelerated pace. Doubtless the end of the coal, at least as an article of a mighty commerce, will arrive within a period brief in comparison with the ages of human existence. In the history of humanity from first to last the few centuries through which we are now passing will stand out prominently as the coal-burning period.

It is a noteworthy fact that the possibility of the continued existence of the human race depends fundamentally upon the question of heat. If heat, or what is equivalent to heat, does not last, then man cannot last either. There is no shirking this plain truism. It is therefore necessary to review carefully the possible sources of heat and see how far they can be relied upon to provide a continuous supply.

Of course it is obvious that the available heat generally comes from the sun. It may be used directly, or it may be and often is used indirectly, for nothing can be more certain than that it is sun heat in a modified form which radiates from a coal fire in the drawing-room or from a log fire in the backwoods. As the sun shines on the growing vegetation, the leaves extract the warmth from the sunbeams. The organism wants carbon, and to obtain it decomposes the carbonic acid gas of which a certain proportion is always present in the air. To decompose this gas requires the ex-

pendituro of heat or of what is equivalent to heat. But this does not show itself in raising the temperature of the carbon and oxygen after they have been dissociated. Their temperature may be no higher than was that of the carbonic acid from which they have come, but the heat has been expended in the process of forcing the several molecules asunder from the close and intimate union of their combined condition.

As the growing plant must have carbon, it draws that carbon from the atmosphere, and the heat that is required to effect the decomposition of the carbonic acid is obtained from sunbeams. When the carbon thus derived by the plant comes ultimately to be burned it reunites with the oxygen of the air, and in the act of doing so evolves an amount of heat precisely equivalent to that which was absorbed from the sunbeams. Thus it is that the heat now radiating from our fireplaces has at some time previously been transmitted to the earth from the sun. If it be timber that we are burning, then we are using the sunbeams that have shone on the earth within a few decades. If it be coal, then we are transforming to heat the solar energy which arrived at the earth millions of years ago.

The question as to the continued existence of man on this globe resolves itself eventually into an investigation as to the permanence of the heat supply. Doubtless human life requires many other conditions, but of this we may feel assured, that if the heat fail and if nothing else be forthcoming which can be transformed into heat, then most assuredly from this cause alone there is a term to human existence. Before discussing the prospect of the duration of sunbeams we may first consider a few other less important sources of heat. So far as the coal goes, we have already observed that as it is limited in quantity it can offer no perennial supply. Doubtless there is in the earth some quantity of other materials capable of oxidation, or of undergoing other chemical change; in the course of which and as an incident of such change heat is evolved. The amount of heat that can possibly arise from such sources is strictly limited. There is in the entire earth just a certain number of units of heat possible from such chemical combinations, but after the combination has been effected there cannot be any nore heat from this source.

Then as to the internal heat of the earth due to the incandescent state of its interior. Here there is no doubt a large store of energy, but still it is of limited quantity, and it is also on the wane. This heat is occasionally copiously liberated by volcanoes, but ordinarily the transit of heat from the interior to the surface and its discharge from thence by radiation is a slow process. It is however sufficient for our present purpose to observe that slow though the escape may be, it is incessantly going on. There is only a definite number of units of heat contained in the interior of the earth at this moment, and as they are gradually diminishing, and as there is no source from whence the loss can be replenished, there is here no supply of warmth that can be relied on permanently. It must also be mentioned that there exists another store of energy which under certain conditions admits of being transformed into heat. I allude to the energy which the earth possesses in virtue of its rapid rotation on its axis. In this respect we may liken our globe to a mighty fly-wheel

which contains a certain quantity of energy that must be poured forth as its speed is reduced. It is the action of the tides which enables this form of earth energy to be transformed into heat. The tides check the speed with which the earth rotates. The energy thus lost must in part at least be transformed into heat which is then again lost by radiation into space. Of course the quantity of energy which the earth possesses by reason of its rotation is of limited amount, and it is steadily being dissipated just as the internal heat is being lost and just as the potential heat that exists in consequence of unsatisfied chemical attraction is also declining. It seems that whenever the tide shall have so checked the earth that it only rotates at half its present speed, the quantity of the energy now existing in consequence of the rotation will have been reduced to a fourth of its present value.

Next as to the various forms in which sun heat is received. We have already referred to the mode in which it is captured by growing plants. There is also another indirect method in which the sun heat is made to provide energy useful to man. The waterfall which turns the millwheel is of course really efficient because the water is running down, and it can only run down because it has first been raised up. This raising is accomplished by sunbeams. They beat down on the wide expanse of the great oceans, there they evaporate the water and the vapour soars aloft into the heights of the atmosphere where it forms clouds. It is of course the solar energy that has performed this task of lifting, and as the rain descends it becomes collected into the streams and rivers which on their way to the sea are made to turn the waterwheels. In like manner it is of course the action of the sun which sets in motion great volumes of air to form the winds, so that when we employ windmills to grind our corn we are utilizing energy diffused from the sun.

It goes without saying that the welfare of the human race is necessarily connected with the continuance of the sun's beneficent action. We have indeed shown that the few other direct or indirect sources of heat which might conceivably be relied upon are in the very nature of things devoid of the necessary permanence. It becomes therefore of the utmost interest to inquire whether the sun's heat can be calculated on indefinitely. Here is indeed a subject which is literally of the most vital importance so far as organic life is concerned. If the sun ever ceases to shine, then must it be certain that there is a term beyond which human existence, or indeed, organic existence of any type whatever cannot any longer endure on the earth.

We may say once for all that the sun contains just a certain number of units of heat actual or potential, and that he is at the present moment shedding that heat around with the most appalling extravagance. No doubt the heat-hoard of the sun is so tremendous that the consequences of his mighty profusion do not become speedily apparent. They are indeed, it must be admitted, hardly to be discerned within the few brief centuries that the sun has been submitted to human observation. But we have grounds for knowing as a certainty that the sun cannot escape from the destiny that sooner or later overtakes the spendthrift. In his interesting studies of this subject, Professor Langley gives a striking illustration of the rate at which the solar heat is being squandered at this

moment. He remarks that the great coal-fields of Pennsylvania contain enough of the precious mineral to supply the wants of the United States for a thousand years. If all that tremendous accumulation of fuel were to be extracted and burned in one vast conflagration, the total quantity of heat that would be produced would no doubt be stupendous, and yet, says this authority, who has taught us so much about the sun, all the heat developed by that terrific coal fire would not be equal to that which the sun pours forth in the thousandth part of each single second. When we reflect that this expenditure of heat has been going on not alone for the centuries during which the earth has been the abode of man, but also for those periods which we cannot estimate, except by saying that they are doubtless millions of years during which there has been life on the globe, then indeed we begin to comprehend how vast must have been the capital of heat with which the sun started on its career.

But now for the question, of supreme importance so far as organic life is concerned, as to the possibility of the indefinite duration of the sun as a source of radiant energy. It may indeed be urged that there is no apparent decline in the warmth of the sun and the brilliancy of the light that he diffuses. There is no reason to think from any historical evidence, or indeed from any evidence whatever, that there is the slightest measurable difference between the radiance of the sun that was shed on the inhabitants of ancient Greece and the radiance that still falls on the same classic soil. So far as our knowledge goes, the plants that now grow on the hills and plains of Greece are the same as the plants which grew on the same hills and plains two thousand years ago. It is, of course, true that the significance of the argument is affected by the circumstance that organisms by the influence of natural selection can preserve a continuous adaptation to an environment which is gradually becoming modified. The olive grows in Greece now, and a tree called by the same name grew there a couple of thousand years ago. I do not suppose that anyone is likely to doubt that the ancient olive and the modern olive are at all events so far alike that plants identical in every respect with the olive of ancient times could flourish where the modern olive now abounds. That there have been great climatic vicissitudes in times past is of course clearly shown by the records of the rocks. It is almost certain that astronomical causes have been largely concerned in the production of these changes, but from among these causes we may exclude the variations in the sun's heat. There does not seem to be the least reason to suppose that any alteration in the rate at which the sun diffuses heat has been a cause of the vicissitudes of climates which the earth has certainly undergone within geological times.

And yet we feel certain that the incessant radiation from the sun must be producing a profound effect on its stores of energy. The only way of reconciling this with the total absence of evidence of the expected changes is to be found in the supposition that such is the mighty mass of the sun, such the prodigious supply of heat, or what is equivalent to heat that it contains, that the grand transformation through which it is passing proceeds at a rate so slow that, during the ages accessible to our observations, the results achieved have

been imperceptible. Think of a sphere the size of the earth. Would it be possible to detect the curvature of a portion of its equator a yard in length? To our senses, nay, even to our most refined measurements, such a line, though indeed a portion of a circular arc, would be indistinguishable from a straight line. So is it with the solar radiation. To our ephemeral glance it appears to be quite uniform; we can only study a very minute part of the whole series of changes, so that we are as little able to detect the want of uniformity as we should do to detect the departure from a straight line of the arc of a circle which we have given as an illustration.

We cannot, however, attribute to the sun any miraculous power of generating heat. That great body cannot disobey those laws which we have learned from experiments in our laboratories. Of course no one now doubts that the great law of the conservation of energy holds good. We do not in the least believe that because the sun's heat is radiated away in such profusion that it is therefore entirely lost. It travels off no doubt to the depths of space, and as to what may become of it there we have no information. Everything we know points to the law that energy is as indestructible as matter itself. The heat scattered from the sun exists at least as ethereal vibration if in no other form. But it is most assuredly true that this energy so copiously dispensed is lost to our solar system. There is no form in which it is returned, or in which it can be returned. The energy of the system is as surely declining as the energy of the clock declines according as the weight runs down. In the clock, however, the energy is restored by winding up the weight, but there is no analogous process known in our system.

—*Fortnightly.*

SOME MISTAKES ABOUT WORDS.

FEW subjects possess greater charms, or have had more attention bestowed on them of late years, than the study of language. For the philologist it must always be a source of the highest interest to trace the laws by which whole languages have diverged or disappeared, and the principles which have guided the formation of particular words and expressions. Among the general laws, however, which govern the formation of words, many curious perversions are to be found. Indeed, a whole chapter of the history of every language might well be devoted to an account of the odd freaks and whimsicalities to be traced in the history of certain words. It may be of interest to give a few instances of the curious shifts to which people have been put to account for the connection between words, and especially of the many cases which occur where, from a similarity of sound or sense, or both, between two words which are really quite distinct, an unconscious association has been formed.

The examples to be given may be divided into three kinds. Our first list of words is taken from that large class which whether by accident or error, have become so like other already familiar words as to be unconsciously associated with them in derivation and meaning. Nine persons out of ten would probably give

the derivation of 'blind-fold' as coming ing directly from 'blind' and 'fold,' from the practice of 'folding' a cloth round the eyes, as in the game of Blind-man's Buff. The word has, however, nothing to do with 'fold,' but means 'felled,' or struck blind, and might be written 'blind-felled.' In the same way the word 'buttery' is easily confused with the common term 'butter,' with which, however, it has no connection, save in the minds of those who do not know it to be a contraction for 'bot-tlery,' a place where 'bottles' are kept, and over which the 'bottler' or 'butler' presides.

To speak of a person acting in a 'gin-gerly' fashion would certainly convey a clear enough idea, and we easily con-nect the word in some vague manner with the word 'ginger,' perhaps from the association in our minds of the spar-ing use made of that condiment. The word, however is innocent of any such roundabout derivation, and comes di-rectly from the old word 'gang,' to go—still preserved in the Scotch phrase, 'gang that gate'—and thus originally means with cautious, faltering, or 'gin-gerly' steps. Again, in using the word 'blunderbuss' we unconsciously imply a sense of disparagement for the shooting powers of our forefathers contrasted with the precision of the modern rifle. The word itself has, however, a terrible enough meaning, and disdains all con-nection with 'blunder.' 'Blunderbuss,' in fact, as we have it, is a strange cor-ruption—perhaps not altogether unting-ed with the sense and sound of 'blunder' —of the old Dutch word 'donderbus,' which can be literally translated into the English 'thunder-box' or 'thunder-barrel.'

Two such simple words as 'greyhound' and 'humble-bee' seem the last to cause difficulty as to their meaning in ordi-nary use; yet few people would guess that the first part of the former is un-connected with our name for a common color, and is in reality an Icelandic word signifying a 'dog,' the whole word thus becoming 'dog-hound.' In the case of 'humble-bee,' guesses would probably preponderate in favor of deriving the word from 'humble,' meaning 'lowly,' as opposed to the correct derivation from the 'humming' sound which is the distinguishing point about this insect. Perhaps, however, the popular deriva-tion may be partly attributable to the well-known fable where a contrast is drawn between the plodding and con-tented bee and her gay and thriftless cousin the wasp. This word 'humble,' curiously enough, gave rise to another popular fallacy. In the phrase 'to eat humble-pie' there seems little ingenuity required to connect the word 'humble' with the ordinary use of the word. But with this in reality it has nothing to do, the 'humble pie' being, properly speak-ing, the dish made from the 'numbles' or inferior parts of a deer's carcase, which would naturally be the portion of menials or 'humble' folk.

In the case of the word 'steelyard,' a popular etymology which derived the word from 'steel' and 'yard' would have a seeming confirmation in the fact that the instrument designated is actually made of steel and is about three feet long. The real derivation of the word, however, takes us back to the 'yard,' or court, in London where the traders of the Continent sold their steel, and which was regulated by the 'Merchants of the Steelyard.' In this yard, or court, there would stand some kind of balance for weighing the metal, and this meaning

soon supplanted the original word. 'Steelyard' has thus, as we see, so far as etymology goes, nothing to do with a yard measure, though such an idea is inseparably associated with our use of the word.

The help of an historical dictionary of the language would surely be necessary to bring us to believe that the easy-looking word 'shame faced' is unconnected with face. The term is, however, a corruption of 'shamefast,' an old word meaning 'fast,' firm, or steadfast in shame or modesty; and the last syllable, 'fast,' being pronounced so like 'faced' or 'face,' the part of the body most expressive of the feeling of shame, the transformation of the word into its modern form becomes easy of explanation. Quite as legitimate as this transition seems that between paying off a man and 'cashiering' him; yet the verb 'to cashier' has nothing to do either with 'cash,' meaning money, or with 'cashier,' a person who looks after it. The verb comes from an old French word meaning to break off or discharge, and thus is unconnected with 'cash,' which, though now used in the sense of money, was originally applied to the box in which it was kept.

Two words, 'purblind' and 'parboil,' are interesting as showing how a false derivation or association of sound can change the meaning of a word. 'Purblind' originally meant 'purely' blind; but probably, through confusion with the verb 'to pore,' it has now the meaning of 'partly' blind. In the same way, to 'parboil' at first signified to boil 'purely' or thoroughly; but through confusion with the word 'part,' the meaning has been modified to that of boiling 'partly.'

Perhaps few would venture to seek a connection between 'oakum' and oak;' but fewer still would be happy enough to give the correct derivation, and connect it with 'comb,' the tool with which the substance is teased out.

The verb 'gang,' to go, which we saw lay at the root of the word 'gingerly,' is also of use to distinguish the two terms 'gauntlet' and 'gantlet,' which seems in some way to have been confused in sense as well as sound. The term 'gauntlet,' in the phrase 'to throw down the gauntlet,' is evidently a diminutive of the French 'gant,' a glove, and refers to the old feudal practice of the challenger in the lists throwing down the mailed glove, which was picked up by the accepter of the challenge. But in the expression 'to run the gantlet' we have a word of totally distinct derivation, coming from 'gang,' to go, and referring to the space over which the culprit or fugitive had to 'gang' before he was clear of danger. Once more: many people nowadays connect the expression 'train-oil' in some way with locomotives and railroads. There was no danger of this mistake sixty years ago, when trains were little known, and train-oil (compare tear, something squeezed out), or the expressed fat of whales, was a common article of demestic use.

We now pass to a second class of words which illustrate, from a slightly different point of view, the vagaries of popular etymology. No philological principle is found to hold with greater consistency and completeness than this, that words which, though originally perfectly understood, have come to lose their first clear meaning, very frequently undergo a change, whereby they become connected in form and sound with others totally distinct. People must have words which they can understand

and recall; and in order to gain simplicity and ease in remembering, they do not scruple to mutilate an offending term beyond recognition. In Scotland, for example, the popular ear found nothing to attract it in the term 'lilac,' a word of Persian origin; but by changing the foreign name into 'lily-oak,' familiarity and ease in recognition were gained at the expense of strict terminology.

It is said that the manifestly corrupted word 'isinglass' owes its change from a foreign to its English dress to the popular fancy, which, finding the Dutch term 'huizenblas' (sturgeon-bladder) meaningless in English, quietly changed it into 'isinglass,' and secured its easy remembrance from association with the 'icing' purposes for which it is used, and the 'glassy' appearance it presents. The two terms, 'crayfish' and 'causeway' singularly exemplify the same ready method of treatment to which words are subjected when they fail to convey their meaning with the requisite ease. The last syllable of the French ecrevisse would necessarily be without sense to us; and the ingenuity which converted it into 'fish,' and the whole word into 'crayfish,' at once gave the name an English look and a sound which might suggest the thing signified. In the case of 'causeway,' again, we find popular etymology overdoing itself. We have the modern French word 'chaussee,' which, through its progenitors, was represented in English by 'causey.' A vulgar ingenuity, however, stepped in and accounted for the last syllable by supplying what it considered the original spelling, 'way,' and thus left the first part of the word quite unaccounted for, though the word as a whole gained a form which rendered it more familiar to the English eye.

A still more remarkable instance of this tendency to change and even mutilate a word in order to give it a familiar and suggestive appearance is found in the expression 'jerked-beef,' which is a ready English substitute for 'charqui,' the Peruvian word for meat cooked in smoke, or 'jerked.' Such a liberty taken with a foreign word may readily be pardoned when so happy in result; but the necessity for changing 'lustrine,' a French word for silk, into 'lutestring,' may be questioned, seeing we have many words, such as 'lustre' and 'lustrous,' from the same root. But there is no accounting for fancies. Many persons must have been struck with the awkward beginning of the line in the hundredth psalm:

> For why? The Lord our God is good.

The truth is, popular ingenuity—represented in this case, perhaps, by the printer—has taken the liberty of changing the old word 'forwhy,' meaning 'because,' which gave good sense, and translated the original, but which had fallen out of common use, into the modern 'for why?' Surely the restoration of the word might still be attempted before it is too late.

Another curious instance of the false ingenuity of the popular mind when put to the test is to be seen in the simple-looking word "titmouse.' The first part of this word is very easy, and means something small, as we see in 'titlark' and 'tomtit.' The Middle-English form or our word was, however, 'titmouse,' the last part of which means a small bird, and has nothing to do with 'mouse.' Not only, however, did the popular fancy seize on the form 'titmose' as more familiar and suggestive, but it was so captivated with its own cleverness

that the plural of the word became 'titmice!'

The explanation of the word 'belfry' is interesting in this connection. The word has originally no connection with 'bell,' an idea which is now intimately associated with the term. The first meaning given is 'watch-tower,' from the Middle English 'berfry,' a watch-tower. The first part of this word is connected with 'borough,' the second with 'free.' As the practice grew of hanging 'bells' in such towers, people reminded themselves of the fact by changing the word 'berfry' into the modern 'belfry.' In modern times, with our wide diffusion of education, the spread of books, and the steadying influences of printing, the tendency, illustrated above, to sacrifice accuracy in terminology to simplicity in form and sound, connot much longer hope to find illustration. Yet in the word 'sparrow-grass,' a corruption of 'asparagus,' we can still trace the striving of the popular ear to find a word which will sound less unfamiliar and unmeaning. Were the counteracting influences of education and printing to cease, this vulgar substitute might possibly find a place among the acknowledged vocables of the language.

There is still another class of words to which it may prove interesting to draw attention. The tendency to throw unfamiliar words into more intelligible form is often supplemented by a striving to account for them as they stand by some fanciful and generally fictitious explanation. The ancients were unaccountably ignorant of the principles of word-formation, and even so late a writer as Justinian derives the word 'testament' from 'testis,' a witness, which is right, and 'mens,' the mind, which is nonsense. Every one has heard of the famous derivation of the Latin 'lucus,' a grove, from 'lux,' light, the connection between the two words being explained by the fact that in groves there is little or no light!

The Greeks, when put to it to explain the word 'Amazons,' a tribe of female warriors excelling in archery, broke the word up into two, 'a' and 'mazon,' which in Greek mean 'without a breast,' and, to give color to this derivation, invented the absurd story of these warriors cutting off their right breasts to enable them to draw their bows more easily!—The writer was taught that the word 'barbarous' came from 'barba,' a beard, because such people did not shave; and that 'Scot-free' meant as free as the Scots when returning from a marauding expedition across the Border! This latter word of course really means free from contribution, 'scot' being a payment which is 'shot' into a box. The true meaning of the term is seen in the phrase 'scot and lot,' which forms the subject of an interesting paper in the Transaction of the Philological Society for 1876.

The famous story of the word 'sirloin,' or, more properly, 'surloin,' is of more recent creation. A king of England—the 'Merry Monarch,' most likely—coming in hungry one day from the chase, had served up to him a savory loin of beef. So delighted was the famishing king at the sight of his favorite dish that he knighted it on the spot, and is it not known as 'Sir Loin' even to this day? The story is of course a mere fabrication. The first part of the word, which seems to have tickled the fancy of talemongers, is a common component of words in our language, and appears in the common term 'surface.' 'Surloin' or 'sirloin' will therefore mean simply

the upper part of the loin, just as the *sur*face is the upper face of anything.

Another word to which popular fancy —always attracted by what is unusual and out of the way—has attached a story, which, though not baseless, is yet inconsistent with fact, is the term 'cabal.' The vulgar derivation which gives it as coming from a combination of the initials of the five statesmen who formed the Cabinet of 1671, Clifford, Arlington, Buckingham, Ashley, and Lauderdale, seems ingenious enough to be true, were it not for the awkward fact that the term is really of Hebrew extraction, imported into the language and used a century earlier than the date given above.

Two other words will suffice to bring our list to a close. What is the etymology of the term 'cockatrice?' It is a lineal descendant of the English and Greek word 'crocodile;' but the 'r'–a frequent offender in this respect–dropped out, and the word then became easily confounded with the English 'cock.' But the word, through this confusion with the name of a familiar bird, had lost much of its original terrible significance. To regain for it its lost association of terror and 'uncanniness,' while retaining its familiar sound, the hideous story was invented of the cockatrice being hatched from a cock's egg!—Lastly, in the expression 'Jerusalem artichoke' we have a curious turnabout of words which would require a lengthy explanation. Suffice it here to say that originally the word had nothing to do with the Holy City, but comes directly from 'girasole,' the Italian name for a sunflower. This blunder is now doubly irreparable. People will always connect this vegetable in some way with Jerusalem, and we are even taught to call the soup made from it 'Palestine Soup!'—One other word and we are done. Many people must have wondered where all the briars are grown from the roots of which are cut the pipes so well known to smokers as 'briar-root pipes.' It need scarcely be said that no pipes are made from the briar. The word briar-root is undoubtedly a corruption; and the derivation of 'Beirout' (a town which is said to export large quantities of the wood used in the manufacture) has been suggested. Most people would, however, prefer to side with Kingsley, and ascribe it to the French word for heath (bruyere), the tough woody fibre of which is peculiarly adapted for the purpose required.

—*Chamber's Journal.*

DIAMOND-MINING. II.

LIEUTENANT-COL. KNOLLYS.

BY degrees the De Beers company has brought up the four principal mines in the district, which are included in the limited space of four square miles, and comprise the Kimberley, area 31 acres; Du Toits, 35 acres; Bultfontein, 27 acres; while the Be Beers proper, the most valuable of all, spreads over 18 1-2 acres. In addition it has a large proprietorship in Brazilian mines. The directors therefore strenuously insist, with every appearance of sound reasoning, that the purchase of their shares should not be regarded as a speculation like gold-mine property, but as a safe and permanent investment.

They claim that being the chief diamond producers in the world, they can so regulate the issues of stores to the market that they can maintain a steadily uniform price, and that their unworked "blue," even at the present level, will suffice for many years' harvest on the existing scale. But as yet the bottom has not been plumbed, and the deeper the shaft the richer the produce. I may mention the theory, which, however crude, is not entirely without verisimilitude, that the diamondiferous material has been thrust up by igneous agency from immense profundity through a superincumbent mass; that the same agent had long ago crystallized the diamonds; and that if we could dig down to that crust we should find the precious stones sticking to the roof like pieces of suet in a pudding. Nor is it argued—can there be the smallest doubt?—after such long and extensive experience, as to the uniform average richness of the earth. For instance, the accepted estimate that one De Beers truck-load will produce 1 1-2 carat is useful and true in theory only, but that a thousand loads will bring to light 1,500 carats is perfectly accurate in practice.

One morning when I was inspecting the works the 400-carat stone to which I have already alluded was discovered, and great was the curiosity and interest excited throughout Kimberley generally. But the mining managers were supremely indifferent; the find would merely help to balance the average, and its direct influence on the gross receipts would be quite inappreciable. Should there be any temporary surfeit of stones in England, the demand in America, and especially in the States, is steadily increasing, and there is an encouraging prospect of a fresh field for sale in the vast and populous Chinese empire. On the other hand, the counter-arguments must be conceded, that it is quite within the bounds of possibility the demand for diamonds may simultaneously diminish throughout the world; and there exists the still more serious contingency of the discovery of fresh and extensive surface-washings, so inexpensive in working as to lessen materially the value of the Kimberley mines with their costly machinery.

With some sensation of relief I turn from poring over these—shall I say stupid?—stones, to the remarkable system of native labor organized for their collection. I have already alluded to the extreme facilities for pilfering them; and to counteract this as effectually as possible a large native compound—an inclosure within the mining inclosure—has been established, comprising an area of 1 1-2 acres, surrounded by corrugated-iron sheeting, about 10 feet high and very difficult to climb. Incessant watch and ward, iron portals, bolts and bars, are safeguards against the escape of insiders; and all outsiders are subjected, like ourselves, to a scrutiny of our appearance and an examination of our passes, ere admitted within the precincts of that anomaly—a prison for free men. One working shift is being actually employed in the mines, but the remainder, 1,400 or 1,500 in number, constitute a strange collection of numerous tribes, collected from every quarter of South Africa, which would engross the interest of an enthusiastic ethnologist. Nor is the sight altogether displeasing: laughing and talking, basking and sleeping, eating, smoking, and playing, are in full swing; but the concourse of so many perfectly nude blacks represents a type of life so strangely re-

moved from civilization that we need all the dictates of humanity and religion to prevent our constantly forgetting "after whose image" all these men are made. An English superintendent conducts me through the establishment, and by degrees the impression of noisy chaos is changed into an appreciation of the system and order maintained. In one corner are quarters reserved for the European warders; elsewhere is a large butchery where good mutton is sold at 8 cents, and beef at 6 cents a pound. The superior tribes, that is to say, the most industrious, intelligent, reliable, and stalwart, such as the Zulus—are flesh-eating, and habitually consume as much as 1 1-2 lb. daily; the inferior—as, for example, the Korannas and Bushmen—subsist entirely on mealies and other vegetable diet. Here is a canteen on an extensive and comprehensive scale, furnishing the natives with every article of daily life they have learned to require by association with Europeans, and with every description of grocery for which they have a fancy. Beer, spirits, or alcohol in any form whatsoever, are, however, rigidly excluded, and although Kaffirs are prone to excessive intemperance, and here have plenty of money at their disposal, they readily accept the restriction—one more instance of the advantageous practicability of suddenly depriving habitual inebriates of their poison. The receipt of high wages powerfully develops the craze for gambling, as innate in blacks as in whites. A group is collected in a shady corner absorbed in a game of childish simplicity with cards, which a Kaffir deals with the neatness and rapidity of a professed prestidigitator. The stakes are 10 cents per deal—as ruinously high as unlimited loo would be to Englishmen—and the winners clutch at their gains with a frenzy quite at variance with the ideal impassiveness of the savage. Elsewhere, in the open, cooks are preparing food in large caldrons for their respective tribes. A hasty inspection of some of the nauseous seething messes conveys to me the impression that the chief constituents are heads and entrails. Tribes are kept apart in separate huts, for were there an indiscriminate mixture one half would quickly be at the throats of the other half. The interior of the dwellings mark curiously the gradations of savagedom. In some—for example, amoung the Zulus—comparative neatness, order, and cleanliness prevail; their blankets and rugs are brightly striped, their rags are brilliant, their sleeping-places have some semblance of being human resorts, and even faint traces of attempted decoration can be detected. In others, notably among the Baralongs and Batlapins, the interiors are like nothing else than the lairs of groveling beasts of the field. One habit, however, seems common to all. Whatever the heat of the weather or warmth of the spot the sleeping savage is careful to envelop completely in his blanket not only his body but his head, leaving not the smallest chink for breathing, so that it is marvelous he is not asphyxiated. The higher tribes of Kaffirs are however, clean in their habits, and delight in wallowing in the large compound tank provided for them, and are remarkably free from bouquet de native; whereas a single whiff of a Chinaman is sickening, and proximity even to a bath-loving Japanese elicits an involuntary "phew."

Almost every traveler has encountered certain marvelous experiences which, if he be prudent, he will forbear detail-

ing, under the penalty of being considered a bold-faced liar; and I only venture to allude to the following circumstance because it can be corroborated by many independent witnesses. The Kimberley Kaffirs are extremely fond of cigars, but they smoke with the lighted end in their mouths. When this peculiarity was first mentioned to me I supposed that my informant was cracking a somewhat vacuous joke; but to my amazement I saw numerous instances of the reality in the compound. The native first lighted his cigar by the ordinary method, then turning it around he deftly arranged the hotly glowing end in his mouth, and tucking away his tongue in his cheek, proceeded to inspire and expire the fumes, very gradually consuming the whole of the cigar. The smokers assured me that the process was warm, comforting, delicious, and far superior to the usual mode. On subsequent trial I found that the knack is less difficult to acquire than might be supposed.

The Kaffirs, when hired, enter into agreements for minimum periods of three months, and during these terms they are never suffered to quit the mining inclosure on any pretext whatever. They do not appear to find this restraint irksome; some, indeed, voluntarily thus pass three or four years in unbroken captivity, while others at the end of their contract sally forth for a week's swinish orgies, and then return to renew their engagements. During their incarceration they are at all times liable, and are sometimes subjected, to sudden search, but the thorough and crucial investigation is carried out during their last seven days' residence. On reaching this margin they are separated from the mass of their fellows, closely confined in a large hut set aside for the purpose, and watched day and night like felons under sentence of death. Admitted within its precincts, I see about forty naked fellows either lying on the ground comfortably dozing or squatting, in the contented vacuity of do-nothingness so charming to all torpid intellects. Each Kaffir wears a pair of thick leather gloves, padlocked round the wrist and never for a moment removed. Being fingerless and resembling boxing-gloves without padding, they render the hands almost useless for purposes of hiding or picking or stealing. Their sole custodian is one sturdy Englishman, the picture of boredom, and who unassisted is perfectly competent to maintain order, stop squabbling, and to some extent baffle schemes for theiving. At my request he gives me an example of the way in which his captives are searched before being set free—in addition to certain other effectual measures. Awakening a sleeper by a friendly pull of the ear, "Jigger" is his first injunction, and forthwith the naked savage gravely begins to hop, skip, and jump, as though executing a horn-pipe. These movements would cause stones ensconced about the person to fall on the ground. Next the custodian minutely searches the hair, ears, toes, and every part of his charge's body; then he thrusts his fingers into the native's mouth and rummages about the teeth and inside the cheeks; and finally the suspect is required to waggle his tongue in case any stone shall have been secreted about the root. Were "The History of a Diamond" written, like that of its cousin carbon, "The History of a Lump of Coal," it might furnish us with two scenes in such strange contrast as to leave to us the alternative of a smile or a sneer.

Scene 1.—A squalid African hut; a white overseer is compelling a naked Kaffir prisoner to go through grotesquely degrading antics; a dirty little white stone, only useful to be strung like an ornamental bead, drops from the poor black carcass; overseer triumphantly pounces on the discovery.

Scene 2.—Six thousand miles distant; a London ball-room with all accessories of civilized splendor; the stone reappears cut and in the shape of a brilliant, enhancing the charms of some young loveliness, and prompting the instinct which bids us worship and honor her beauty, as though it were something divine.

Notwithstanding all the precautions I have indicated the blacks occasionally succeed in besting the whites. Some have the knack of stowing a diamond for a few minutes a short distance down the throat, and when the search is over working it back into the mouth by a muscular movement. I am shown several tin boxes used by the natives for holding the rag or two they may possess, and wherein stones have been most ingeniously concealed behind the metal lining or plate or the handle. On one occasion a liberated Kaffir was passing the last outside sentry, swinging a small open flimsy basket, such as children use in England when gathering cowslips. "Let me look at it," said the warder, without any real suspicion, and in the mere vacuity of idleness. The wicker handle was a little loose; it was lightly tacked on to a small slip of wood at the brim, and when pulled aside it was discovered that a neatly concealed cavity had been scooped out, and a valuable diamond deposited therein. Equally ingenious means have been devised for baffling the outside detectives, and for smuggling stones from Kimberley to a remote and safe locality. A diamond is wrapped in a piece of meat and given to a dog which is conveyed out of the district and slaughtered, when the stone is removed from the intestines. Sometimes carrier-pigeons are utilized, and for a long time the parcel-post was rendered an accomplice by means of an ordinary book with a hollow cut out of the central pages, wherein the booty was ensconced. The detective department is elaborately and effectually organized, and breaches of the diamond laws are very properly punished with extreme severity, five years' penal servitude on the government works being a not infrequent sentence. A convict digging at one of the Cape Town forts hid a very valuable diamond, which had escaped discovery when he was apprehended, in a corner of the parapet, as the surest place of concealment. He was unexpectedly transferred temporarily to another work, and on his return found that a large mass of earth had been carted over his *cache*. The diamond has remained unrecovered up to the present day, and the four-gun battery is invested with a halo in consequence of its latent treasure, quite irrespective of its value for annihilating an enemy's ships. Again, no one is allowed to deal in the rough stones without a special license; only cut jewels—which exist in very small numbers in Kimberley—are open to free traffic. Were a casual wayfarer to pick up a chance diamond on a waste piece of land the retention of it or any attempt to sell it would be penal. Yet, as I have already mentioned, the "I. D. B.," as it is called—illicit diamond buying—is carried on to a serious extent, and I could quote one of the most prominently prosperous individu-

als in South Africa, who, as is generally admitted, amassed, in former days, a considerable sum by the nefarious traffic, and who is now flourishing in several public capacities, though, according to rules of justice, he should be behind the bars of a jail. Some years back detectives lighted on a very hotbed of "I. D. B.," but were unable to obtain legal proof. At dead of night some disguised members of the force betook themselves to the thieves' den, and offered for sale a certain number of precious stones. Only a woman was forthcoming, who handled them, admitted that they were genuine, but professing herself unable to do any business, restored them to the fictitious sellers. The detectives withdrew baffled, but were considerably more baffled the next morning on discovering that the intended victim had so cleverly exercised her sleight of hand as to have substituted her own imitation diamonds for the valuable stones originally tendered.

—*Blackwood's Magazine.*

CHINESE LETTER-WRITING.

IT is one of those unfortunate truths which are not to be gainsaid that a certain amount of humbug is necessary for the conduct of civilized society. Truth doubtless is great, but there are things which are even greater than truth, or rather than the expression of truth, and such are the requirements of social intercourse. It is told of a certain royal duke who had the unhappy habit of expressing his thoughts aloud that, in a lull in the conversation at a dinner-party, he was heard to say to himself, "What a disagreeable lot of people these are! I wish I had not come." It is unquestionable that it was out of the fullness of the heart that his royal highness spoke, and it is equally certain that he uttered the truth, from his point of view; but the effect on the company for the rest of the evening was deplorable. It has probably fallen to the lot of most of us to have met people who, without the excuse of an unconscious habit, have the knack of asserting unpleasant truths, and who value the ungracious practice as a sign of honesty. These are mostly young ladies who have entered the lists at competitive examinations, and who in the magnification of narrow subjects have lost the perspective of life. But there are others, such as the Quakers of bygone days, who regard every expression which may not be in strict accordance with absolute truth as a sin against their consciences. To such people the idea of subscribing themselves "Yours truly," or of beginning a letter to a casual acquaintance, "Dear So and So," is abhorrent. But public opinion has been too strong for them, and we continue, and shall continue so long as society holds together, to address one another in terms of endearment and respect which are by no means required to correspond with our actual sentiments.

Orientals have surpassed us in this regard as much as the brilliant sunshine to which they are accustomed excels the murky atmosphere of Europe. The descriptions of ourselves and of our correspondents pale before the glowing expressions of objective admiration and subjective self-abasement which adorn

Eastern epistles. We are content to confine our wishes and compliments to the present life; but such a limit is far too narrow for an Asiatic, who delights in wishing that his friends may live for ever and ever, and that the ancestors of his enemies may be condemned to everlasting disgrace. We are satisfied to speak of "I" and "You," but an Oriental loves to heap adjectives of contempt upon himself and of glorification upon his correspondents.

In translating letters from Orientals interpreters are accustomed to write, "After compliments, the writer says, etc." This is cruel, as the expressions thus ignored have probably formed a prominent idea in the mind of the writer, who has in all likelihood carefully weighed the terms used to indicate the relations which he wished to assume with his correspondent. For example, if a Chinaman wishes to be somewhat cold to an absent acquaintance, he begins his letters by saying, "For some days we have not met." If, however, he is desirous of showing a regard for his friend, he expands the phrase into—"From a distance I have hoped that the blessings of your daily life and the best of good fortune may be such as to gratify you;" or, "Having been separated from you for some days, I have thought eagerly and deeply of you." He then goes on to the subject of his letter, but in all cases he avoids the use of the personal pronouns. By a system of circumlocution necessitated by this omission, he describes himself as "Your younger brother," the character representing his expression being written small, and partly at the side of the column of words, and he designates himself and others conjointly as "We ants." But the person he is addressing figures as "Your Excellency," "My benevolent elder brother," or "Your honor," literally, "You who are at the steps of the council chamber." His own house is "a mean dwelling," or, as the parts of the character signify, "a stricken and broken dwelling;" but he is unable to think of his correspondent's habitation as anything but "an honorable," literally "basket-of-pearls palace." In the same spirit of self-abasement he feels obliged to wind up his epistle with the phrase, "Your stupid younger brother, So and So, bows his head to the ground." The character for "stupid" is drawn for us by two hieroglyphics, meaning "monkey-hearted," for the Chinese are not like the natives of the West Coast of Africa, who believe that the only reason why monkeys do not talk is that they fear if they do they will be made to work; but regard them as silly creatures, which may fairly beheld to represent fools. To bow to his friends is also pictorially expressed by a collocation of "a head" and "turf," suggesting the act of bowing the head to the earth.

If this correspondent proposes to call upon him, he hastens to assure him that "at the appointed hour, with bowing hands, he will await the time when His Excellency shall abase himself by driving his chariot to his office." His friend's letter is "the revelation of his hand," and he takes pains to make him aware that holding it "with washed hands he had chanted" its contents. The pictorial nature of the Chinese writing supplies an interesting commentary on the ideas and habits of the people on the subject which they wish to express, and thus the phrase just quoted is represented on paper by "water in a ewer over a basin," having reference to

the old Eastern custom of cleansing the hands by pouring water over them, and "words bursting forth" as in chant or song. In the same way the symbol for "ants" is made up of two parts, meaning "the righteous" "insects;" a tribute to the orderly habits of the creatures, who recognize among themselves, as the Chinese have observed, the distinctive ranks of prince, ministers, and people. On expressions of thanks particular emphasis is laid by the Chinese, and with true Oriental instinct, in their effort after hyperbole, they are accustomed to give a physical interpretation to their mental feelings. For instance, a correspondent who wishes to say that he is profoundly grateful writes, "Your kindness is very deeply engraved and enveined in my heart." If he hears of the illness of a friend "he cannot help being hung up in suspense," and the symbol he uses shows to the eyes the heart of the writer tied up, while at the same time he urges him "to take care of his person as a pearl." And on the receipt of better news he breaks out, "How shall I bear the joy and pleasure!" Having finished expressing the object of his letter, he winds up by "availing himself of the opportunity to wish his correspondent all the blessings of the season, and," if he is on the road to honor, "all the promotion he deserves."

Tried by the standard of Western ideas, these and similar expressions have, from their exaggerated phraseology, a ring of insincerity about them. But this is not a bit more the case than when we address a man for whom we do not care a brass farthing as "My dear sir," and sign ourselves "Yours very sincerely" to a correspondent with whom we have not a single thought in common. Further, they may be defended on the ground that they have a humanizing and civilizing effect, and are the counterparts on paper of the physical acts of courtesy which are current in the land. It is said that the habit of raising the joined hands above the head when in the presence of a superior owed its origin to the same cause which makes American highwaymen shout "Hands up" when they stop a coach. A man cannot handle a weapon unseen when he is holding his hands above his head, and in a milder degree the less pronounced acts of courtesy have a marked pacific tendency. A man who is always accustomed to bow low to his acquaintances is less likely in a moment of quarrel to use his fists or his feet than one who is not practised in those gentle exercises. And in the same way the use of courteous expressions makes it difficult for a correspondent to turn from the civil to the ferocious.

But, if not ferocious, a sufficient latitude still remains to a Chinaman for the development of much plain speaking. It is as possible to "slit the thin-spun life" with a stiletto as with a broadsword, and in the most finished periods a Chinaman finds himself quite able to express either withering contempt or remorseless hate. But he has other ways also of giving vent to his ill humors. The very punctilious rules of letter-writing enable him to convey his dislike by omission as well as by commission. Chinese is, it may be explained, written in vertical columns, beginning on the top right-hand corner of the page. In ordinary circumstances each column is completed to the bottom of the page; but long usage has established the custom that, if the name or attributes of the person addressed occurs, the column is cut short, and the characters representing these subjects of honor begin the

next column at an elevation of the space of one or two characters, as the case may be, above the general level of the text. The expressions, for example, "Your honorable country," "My benevolent elder brother," and others, are entitled to stand prominently out at the head of the columns—a position which gives them the same kind of distinction which capital letters confer among ourselves. It will now be seen what a ready weapon lies to the hand of a Chinese letter-writer. To write "Your Excellency" or the name of the correspondent's country or sovereign in the body of the column is to inflict a dire insult upon him, and is equivalent to the expression of the bitterest contempt in European epistolary style. Occasionally infringments of this rule are made by mistake, and it not unfrequently happens that condign punishment overtakes careless or ignorant officials who forget its application to the titles of the Imperial family. Not long since an Imperial censor presented a memorial to the throne, in which the proper elevation was not given to the name of the Dowager Empress. The result was doubly disastrous to the writer. Not only was the prayer of his memorial rejected, but he was handed over to the Board of Punishments to suffer the consequence of his error. On foreigners Chinamen used to delight, and still do to a certain extent, in heaping up this and other insults, trusting to the ignorance of their correspondents in the forms and diction of the language. It was their wont to speak of foreigners as "barbarians," or, as the characters depict for us, "Great-bow men," a term applied to savage tribes in Western China. Our knowledge of the language has, however, reached a point when we are able to detect such palpable hits. But being unwilling altogether to give up the privilege they possess, the Celestials are now driven to exercise their ingenuity in conveying covert sneers and impertinences which require the petty and conventional mind of a Chinaman for their detection.

Finally, when the letter is written it is put into an envelope, which is addressed in exactly the opposite form from that used among ourselves. We always descend from the particular to the general; Chinamen, from the general to the particular. Thus, for example, if a Chinaman were to inscribe the equivalent of the address on the envelope which is to contain this article, he would write "London, Southampton Street, No. 38, of the *Saturday Review*, the Editor."—*Saturday Review.*

THE TEACHER.

CONDUCTING RECITATIONS.

MANTIE E. BALDWIN.

1. *Have a definite plan for calling classes to recitation seats.*

For this there is nothing better than the teacher's voice. The constant jingling and tinkling of a call bell is annoying and irritating to nervous and excita-

ble pupils, and disturbs those who are trying to study. Be sure that the room is perfectly quiet, then, in a clear and distinct, but not loud tone, call the class. Have the pupils *walk* in an orderly manner to the recitation seat.

2. *Do not always have the pupils seated in the same order in class.*

Weak pupils naturally seat themselves where they may receive help from stronger or more self-reliant ones. It is well to have them arrange themselves differently, to prevent this if possible. And also to accustom them to think readily in any position or place.

3. *Do not call upon the pupils to recite in the order in which they are seated or arranged in the class.*

Children are always watching for the question that may come to them and when they know they are to recite just after the one who is next to them they prepare themselves to answer a certain question, and, when that is done, are likely to become inattentive.

4. *Do not call upon pupils to recite in the order in which their names are registered in the roll book.*

The same reason may be given for this as for the one above.

5. *Always have each pupil rise to recite.*

Pupils must learn to think when standing as well as when seated. Then, the pupil's standing will have a tendency to prevent his receiving help from those near him. He should stand erect and free from the seat or desk.

6. *Always ask the question before designating what pupil is to answer it.*

This will keep the attention of each pupil in the class. All will then think what the answer should be and will, if necessary, be prepared to tell it.

7. *Always put the question so the pupils cannot guess the answer.*

This is done to make pupils think. A question should be so worded as to require a clear and definite answer from the pupil.

8. *Always put the question so that the answer shall be more than yes or no.*

The pupil should be required to express an opinion on the subject, no matter how trivial the subject may seem. He should think the answer out fully before attempting to give it. Then the answer should be in concise and simple language. But the teacher must be careful not to insist too strongly on precision in expression at first, for timid pupils may become discouraged and refuse to talk.

9. *Do not always ask the questions in the order of the topics in the lesson.*

If the pupils are really prepared on the lesson, they will be able to answer questions, when the order is varied. If they are prepared in a mechanical way only, this may be easily discovered by a variation in the order of topics. Then, too, pupils frequently learn only the part they think they may be called upon to recite, and the change teaches them to be ready on all parts.

10. *Do not always let the bright pupils answer.*

The quick ones and the bright ones are sure to get the points, and are also certain to recite oftener than other more dull pupils. It is much easier for the teacher to let the bright and ready ones do the most of the reciting, and there is a strong temptation to do so when one is pressed for time in the recitation. But it is not just to the other members of the class.

11. *Call twice upon the slow, the dull,*

the timid and the lazy pupils, to once upon the bright and apt ones.

A slow child needs frequent opportunities, in order to quicken his expression of thought. Practice begets habit and he will thus work more speedily. A dull thinker needs the stimulus of being often required to exert his power. A timid child needs frequent recitation to give him confidence. A lazy pupil needs to be stirred up again and again.

12. *Do not save all the easy questions for the slow or the dull or the lazy pupils.*

Make them know they can work out difficult things as well as the more expert pupils can. It is discouraging and humiliating to a sensitive child to feel that little is required or expected of him because he is not quick in speech or thought. A lazy pupil should be forced to do hard thinking. Sometimes the ambition of a lazy boy is roused by being given something really difficult to do.

13. *Do not permit pupils to recite without being first recognized by the teacher.*

Confusion and disorder arise when pupils are permitted to recite as they please. Enthusiasm in the class ought not to be repressed, but each pupil should raise his hand in token that he has something to say, and then the teacher should call upon each to express his opinion on the subject under discussion.

14. *Do not always call upon those whose hands are up.*

When teachers call only upon those who raise their hands, the shirks are quick to note the fact and, by keeping the hands down, escape being called upon. Then, too, some naturally retiring pupils hesitate to put their hands up, though they may know the lesson well. But it is well to notice that some pupils *always* have their hands up, which does not necessarily indicate their knowledge of the lesson; so the shrewd teacher will need to observe closely all their wiles.

15. *Have volunteer recitations frequently.*

This gives the thinking pupils a chance to express their ideas, and arouses enthusiasm.

16. *Rarely let pupils recite in concert.*

The strong grow stronger and the weak weaker by concert recitation. Then it creates more or less noise in the schoolroom, and disturbs other pupils who may be trying to study.

It is sometimes urged that in concert recitations, timid pupils do better and gain courage; and that there is a saving of time by having answers or recitations in concert. This may be to some extent true, but the evil effects overbalance the good ones.

17. *Do not prompt or help a pupil by word or look while he is reciting.*

Some pupils learn to rely upon the teacher's aid, and do no independent work. Others who are poorly prepared, shrewdly watch the teacher's face and, at the slightest sign of disapproval, change the answer they were beginning to make, and by thus guessing their way, contrive to make a recitation.

18. *Do not interrupt or nag a pupil while he is trying to recite.*

When the pupil is attempting to recite, an interruption from the teacher breaks his train of thought and prevents his making a perfect recitation. A nervous child is so thrown out of his self-possession that reciting is impossible, if he is interrupted.

Nagging or sarcastic interruptions from a teacher are mean and cowardly.

However exasperating the pupil may be when reciting the teacher should not sink to the same level in trying to correct the child's behavior. No one but a coward would take advantage of his authority to say cutting things to a child who is probably doing his best in trying to recite.

19. *Have no comments on the work until the pupil is through reciting.*

Though the child may make mistakes, do not let the other children by either act or word show that he has done so till he is through. Then let them *kindly* tell how or where the mistake was made.

And, remember, that it is wise to have the pupils frequently tell the *good points* in the recitation just made.

20. *Sometimes have the other pupils ask questions of the one who has just recited.*

This will cause each one to prepare himself thoroughly on the lesson, and will stimulate all of them to think more keenly.

21. *Stimulate all of the pupils to ask questions outside of those found in the book.*

These questions should be put to the teacher. Children will be encouraged to study many books on the subject instead of one, and to feel that there is much to be learned beside what they have studied.

22. *Use the books as little as possible during the recitation.*

Pupils must be trained to master subjects, and to become self-reliant.

23. *The teacher should use the book very rarely during the recitation.*

This means that the teacher should prepare his lesson beforehand, the most primary as well as the most advanced. He can then give his undivided attento his class; and command their respect for his knowledge of the subject. Children are quick to detect ignorance and lack of preparation on the part of the teacher, and their respect is proportionately diminished, if they find him deficient and dependent upon the book.

24. *Have a definite object in view in asking each question.*

Teachers often waste time by asking meaningless or purposeless questions. Each question should bring out some definite thought.

25. *Plan to accomplish a definite amount of work, or to get over a definite portion of a subject, in each recitation.*

By this is not meant that a class should be crowded or hurried, but that some definite and valuable thing shall have been done or learned each time the class recites.

26. *Recapitulate the points made in the lesson just recited.*

It is always well to go over the points in the lesson, stripping them of details and fixing them clearly in the pupils' minds before the class is dismissed.

27. *Be definite and careful in assigning the new lesson.*

Impress upon the pupils where the lesson begins, what it includes, and to what it extends. Do not take it for granted that they understand. See that each one is paying attention before assigning the lesson.

28. *Before dismissing the class, give whatever drill is necessary to enable the pupils to master the lesson just assigned.*

They must know what is expected of them in the preparation of the new lesson. They cannot work at it intelligently unless shown what points are to be brought out, or what principles are to be learned. Hard words, technical terms, new processes, should all be made

plain by the teacher. Then the pupils can go to their seats and study with zeal and intelligence.

29. *Never give the same lesson over.* If it was not mastered by the pupils in the first trial, ascertain why. It may have been too long, or too difficult, so that they could not learn it. It may have been too short or too easy, and they delayed learning it till too late, or did not try to learn it at all. In any case, when necessary to repeat the points or principles involved in the lesson, better give *new* problems or sentences involving those points. Then the pupils will have greater interest and a desire to atone for the poorly prepared lesson just recited.

30. *Do not call another class up to recite till the one just dismissed is quietly seated for study.*

Disorder in the schoolroom arises from having two sets of pupils on the floor at the same time. Time is really saved and much annoyance spared the teacher, by being careful to observe this rule.

CHRISTOPHER'S "AT HOME."

TUDOR JENKS.

OF course he may have been asleep and have dreamed it all. It's an easy way to explain those odd happenings and queer goings-on that we don't know anything about, to say, "Oh! he dreamed it." But here's the story, just as Kit told it to me; and Kit is a very wide-awake sort of a lad—he's our short-stop, you know, and we don't have sleepy-heads for short-stops in the Alert Nine, I can tell you.

You see Kit had to hand in a composition on Friday. Like most boys in the class, he put off writing it until Thursday night, and then he knew he had to do it. So he went into the library—they have a good library room at the Johnson's (Christopher Johnson is his company-name)—and he sat down before their big green-baize table, spread out a lot of commercial-note paper, got a pen and dashed right at it.

Kit is a good writer, and he can roll off a composition just like anything. The subject he took was "Columbus's First Voyage." He likes historical subjects, so he took that instead of "My Pets," or "A Day in the Fields," or "My Favorite Game," which were the others.

You see Kit is a lively sort of a boy, and he reads a good many exciting books, and that gives him a style of writing that isn't usual among boys.

I suppose most fellows would have begun this way:

"Christophero Columbo was born in the year so-and-so, in the obscure little town of you-know-its-name-better-than-I-can-tell-you," and so on.

But Kit likes something snappier than that. So he got his elbows as far out on each side of him as he could reach, held his pen so tight that it wanted to squeal, bent his head over toward his left shoulder, his tongue out like that of a really fashionable pug, and reeled off this opening sentence:

"Little could the proud Ferdinand brook such insalence from a comparitively unknown advent-

urer no more he said with h iwty dis.lane tire our royal ears with thy rash sk:me:s we have no gold to wast on thy vane vaporings and he would have dismised Columbus without further parly but here the beautiful Is.ibella bes ort him to pause for a moment A boon a boon my lege she cried I have gewels in my cofer Let me sell them and fit out a vessel Mayhap we may thus acuire vaste domanes and convert many hethen."

I copied this word for word from the first page. Kit can spell when he tries, but he spells just anyhow when he's in a hurry.

That was as far as he had written when there came a knock on the door. Now, Kit hoped it was his sister Helen. Helen was always good to Kit; and, especially on composition-days, Kit fully appreciated what it was to have such a sister.

You see Helen was one of the studying kind, and she would look over Kit's compositions and put a little pencil mark opposite the words that she wanted him to look up in the dictionary.

Kit was an honest little fellow, and he told the teacher about it; but she said it was all right, so long as Helen didn't write the words out for him. Helen used to punctuate for him, too, sometimes; for Kit couldn't have patience to put in all the dots and dashes for himself. He said he couldn't bother with them; they interrupted the flow of his ideas.

But it wasn't Helen who had knocked at the library door, as Kit found out when he said, "Come in!"

The door opened slowly, wider and wider, until it stood wide open. And then a procession came in, led by a courtly little gentleman in small clothes, wig, silk coat and waistcoat, and wearing a rapier at his side. He was only an inch or two tall.

"Permit me," he said, bowing to Kit much as the dancing-master does when you come in late, "to introduce myself and my companions. Understanding that you had devoted the evening to letters, I have invited myself to be present, in order to render any assistance that may lie in my power. I am known as the Master-of-Ceremonies," and he bowed again.

"Glad to see you," mumbled Kit, looking at him with very wide-open eyes. "Won't you and your friends sit down?"

"Thank you, no," answered the leader. "We don't care to delay. We will duly take our places where we belong. Let me look at your composition," and the little Master-of-Ceremonies hopped upon the table and began to read it aloud. When he came to the word that Kit had spelled *insalence*, he drew his sword and pointed toward the *a*.

"You're needed here, O," he said.

At once a rotund little gentleman came rolling across the room; the A jumped out of the word, and O inserted himself in its place.

"He's an usurper," he said. "That is my place. I've owned that place ever since the Romans accustomed me to it."

"Quite right," said the Master-of-Ceremonies to Kit. "You'll find his title made out plainly in the Latin dictionary."

"I had no wish to keep him out," said Kit. "What shall I do with Mr. A?"

This last question was suggested by seeing that gentleman, who had risen to give place to Mr. O, wandering uneasily over the page.

"Fortunately we can make room for him between the R and the T in *comparitively*," said the Master-of-Ceremonies, looking a little further down the sheet.

So A, looking much relieved, took the place which I at once yielded to him; Mr. I remarked, "I always feel out of place in those first conjugation derivatives. Suppose I find a place for myself in *disdane*, a few lines down? If Mr. E will kindly make room for me I will sit down on the other side off Miss N, there."

This change was soon made, and Mr. E, without saying, "By your leave," sat down by Miss T in the word "wast," where he felt he was welcome.

"*Adventurer no more*," read the Master-of-Ceremonies. "Where is my friend Mr. Period? Here seems to be room for him.

The gentleman inquired for came forward. He resembled Mr. O, but was smaller, and had a much less open countenance. He settled down after the word *adventurer*, but complained of being lonely. Two small boys, who were twins came forward hand in hand.

"Ah!" said the courtly leader; "the Quotation twins! Suppose you two sit down on those high seats just before *no more*. And—now I notice you, Miss N—there's some mistake. You're in your mother's place. Will Mrs. N please come and sit at the head of this row? Being a matron, Christopher, she is entitled to sit at the head of this row. And as these words seem crowded, suppose we move these down a line, and call the whole a new paragraph group, beginning where the Quotation twins are sitting."

Christopher agreed. But as the Master-of-Ceremonies turned again to the composition, Christopher blushed and picked up the sheet.

"I say," said Kit; "I didn't expect visitors this evening, and I'm afraid it will be a long time before you all find places. Perhaps if you can call again—say to-morrow—I shall have the composition in a little better order."

"Oh! very well," said the little gentleman, repeating his courtly bow; "we had no intention of giving you any trouble; but you see my friends here are somewhat jealous of their places, and they asked me to inquire whether you had any objection to giving them their rights."

So saying, he hopped nimbly down from the table and made his way out of the room, followed by the letters and punctuation marks.

Then Kit went over his work again, and it is really surprising how many excuses he found for the visit paid him.

When Helen came in from dancing-school, she found that Kit had written a very creditable composition.

"Where did you learn to spell and punctuate so well, Kit?" she asked.

"Why, at my 'At home,'" Kit answered; and then he told her of the Master-of-Ceremonies.

"And, Helen," he said in conclusion, "I don't think anybody could forget to put in quotation-marks after seeing those twins perch themselves on their high chairs to hear what was to be said. Nor could any fellow leave out a period at the end of a sentence, if he had seen that exclusive Mr. Period settle himself down and draw away from the following sentence. Then there was an exclamation-point—an old lady with both hands held up in astonishment—who was all ready to express Ferdinand's disdain for Columbus's *rash schemes*. I tell you I'm going to get acquainted with these punctuation people, for they're a very interesting lot."

"I think they are," said Helen. "And it's really very kind of them to stand

around while we read, to explain everything and to tell us just who said everything and how they said it."

"Where did they come from?" asked Kit.

"Oh! they're quite modern, most of them," said Helen. "Some of the older ones have lived many ages, but many are recent. There's the question mark, for instance. He began life as a whole word, so my teacher told me; 'Query,' his name was. Then they gave him a nickname, 'Qy'; and finally he was written only ?, and people forgot that he bore any relation to the letter Q."

"I don't remember that I ever paid any attention to those little marks, except in school," said Kit; "but school or no school, I'm not the fellow to forget my friends, and I'm going to get the Master-of-Ceremonies to bring the whole of them around to see me some day."

"Then it will be the whole 'Kit and boodle' of them," said Helen, laughing.

There! that's what Kit told me about the evening he wrote his composition. I suppose he dreamed it; but it was a funny dream, any way, and seemed to have a sort of moral to it. Didn't it?

I know that it has made Kit a good punctuater, if there is any such word. He uses semicolons now. In fact, I have seen a composition of his telling all about the "Conjunction of Jupiter and Venus" that had real colons in it. His teacher said "My stars!" when she saw it and expressed the wish that all the scholars would punctuate and spell as well as Christopher Johnson did. And then Kit got as red as a beet, and we boys washed his face for him in the snow at recess to keep him from getting too proud. But there's no danger of that. Kit is too good a fellow.

—*Wide Awake.*

SOME LESSONS IN DRAWING. XI.

(*Conical Objects.*)

G. W. FERGUSON.

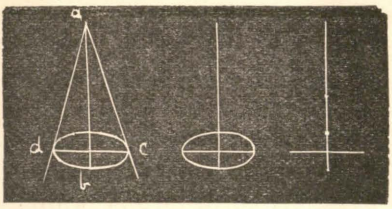
IF the cone be placed in an upright position with its base on the level of the eye it becomes a triangle in appearance, the plane of the base being viewed edgewise.

It would be impossible for us to see more than half way round a cylinder, unless its diameter was less than the distance between our two eyes.

If the cone be placed in an upright position below the eye and a little distance in front of the observer, the ellipse would be visible beyond its center, due to the tapering shape of the object. The profile lines of the cone, in this case, would not appear to be joined to the ends of the longer axis, but to some part beyond the center.

Supposing the pupil now to have a cone placed in the same relative position as has just been described, to make a drawing of it he should proceed as follows: erect a vertical line, line of symmetry, set off the desired height of cone, which may be any height. Observe where the longer axis of the ellipse, or the line connecting the extreme right and left points of the base cd appears to cut the line of symmetry ab. What part of the whole vertical line is the part cut off? say one-eighth. Then we would divide the vertical into

eight equal parts and draw a horizontal line through the lowest point thus found.

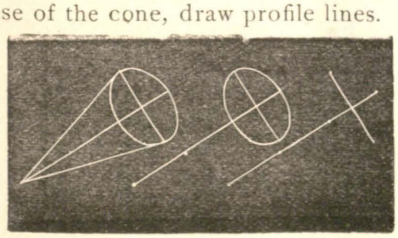


In order to get cd the proper length, we must compare the width of the base with the height of the cone. Supposing it to be half as great we would bisect line ab and make line cd equal in length to one-half ab. One-half on either side of ab. The longer axis does not represent the perspective center of the circular base, but represents the true center of the ellipse. This being true, we will next set off point c, one-eighth of line ab above line cd. The ellipse should now be drawn.

In drawing the profile lines, be sure to have them tangential to the ellipse, and not cut into it. In order to make this clear the profile lines have been extended beyond the ellipse.

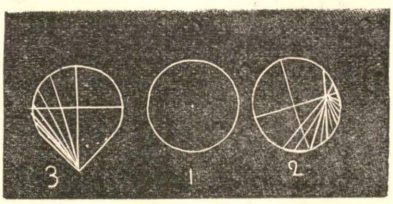
To draw the cone when the base is visible, proceed as you would in drawing the cylinder, the same rules applying here.

Get the slope of the longer axis of the base of the cone. Make this line of any length you choose, bisect it, draw a line through the point of bisection, and, at right angles to the longer axis, set off width of ellipse as shown at J K; also length of cone, and sketch in lightly the base of the cone, draw profile lines.



If the cone is resting on one of its sides with the apex toward the observer, he should proceed in the same manner as when the plane of the base was visible.

No. 1 represents a cone with the plane of its base parallel to the observer and the apex pointing directly towards the eye of the observer.

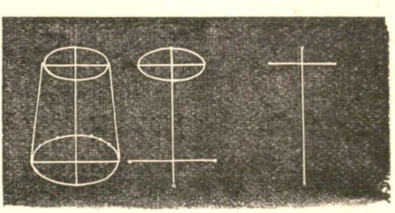


No. 2 represents a cone, when the apex falls just inside the ellipse in appearance.

No 3, when the apex falls just outside the ellipse.

The unseen lines are dotted. The appearance of solidity can only be added by shading.

To draw a frustum of a cone we combine the principles of drawing both the cylinder and the cone.



To draw the frustum in an upright position proceed as you did with the cylinder, by erecting a vertical line, or line of symmetry, and making it of a length equal to the apparent height of the model from the front of the lower to the back of the upper ellipse, draw upper ellipse as you would for a cylinder and the lower ellipse and side lines as for a cone.

When the frustum rests on one of its sides, first, draw the visible ellipse,

then produce the shorter axis, draw farther ellipse, side lines.

Bear in mind that the longer axes of the ellipses are parallel in appearance, also that the shorter axis produced divides the model into two equal parts in appearance.

In drawing any object we should first look for some regular figure as in the bucket or tub. We do not see the cone complete, but in part, yet we look at it and think of a cone, though it is a frustum, and we should bear in mind the figure of which it is a part if we wish to reap the greatest amount of good from drawing any object.

The first question that comes to my mind, when I see an object, is what does it look like?

I recall to memory the objects that I have seen that were similar to it in shape, size and color. Then these questions follow: What is it? Whose is it? Where did it come from? Who made it? Of what is it made? &c. If it is a good work it is either made by God direct, or by God through man.

Each and every lesson from nature may, and should in a few moments, not only lead us to think of the Creator of the things near to us and of the universe, but make us long to have the darkness cleared away so that our vision may no longer be obstructed in this world.

Every true lover and student of nature is drawn closer and closer to his God.

If an artist's object in studying nature is only to reap the mighty dollar for his canvases he is not a true lover of God's works, and hence is not lifted to a much higher plane.

One of our old artists said that to paint Christ we must live with Christ.

Our mind needs to be pure while seeking the great truths and beautiful appearance of the noble works of God.

THE SCHOOL.

THOMAS WENTWORTH HIGGINSON.

LORD TENNYSON gives the best formula ever given for good manners, when he says:

"Kind nature is the best: those manners next
That fit us like a nature second-hand;
Which are indeed the manners of the great."

But what is true of good manners is true of all training, all knowledge. The great reformers in education have always been those who carried us back to the most natural methods: Rousseau, Pestalozzi, Froebel. What drives American reformers constantly back to Horace Mann in educational matters, is because his simple principles are at the bottom of all progress. Such maxims as "What is understood, interests; what interests is remembered" have affected all our teaching. The tendency of mere school organization indefinitely extended and elaborated is always to make everything formal and technical, so that the text-book becomes mere question and answer, to be pumped into the child's mind by main force and to be retained till the next examination day. After that, no matter. An accomplished woman who was many years ago a medal scholar in one of the best Boston schools told me that she was there furnished, on

beginning the study of history, with a sheet of foolscap paper which she was expected to rule in four columns. When she came to a date in the history it was to be written down and so with each in succession till there were sixteen solid columns of dates. These dates were committed to memory, and when she left the school she could begin any column at the top and say to the bottom or begin at the bottom and say to the top or begin in the middle and say either way, or both ways at the same time for aught I know—it does not make much difference—and when she had been out of school six months she had forgotten every date and was glad they were gone. In later years she began all over again to read history for herself and found it the most fascinating of all studies.

At a meeting held to discuss popular education I heard it deliberately asserted by a teacher of wide experience, who had been also a most successful school superintendent and a member of a state board of education, that the children in our public schools spend two-thirds of their time in putting into a more complicated shape things which they know perfectly well already. At the same meeting a lady of equal experience told a story of a little boy who was weighed to the earth by the problem, "If John has two red apples and Charles has two red apples how many red apples have they both?" He admitted that he knew perfectly well that two and two made four; but it was "the process" that was too much for him—to present this simple combination of red apples in precisely the conventional form prescribed in his school. "Oh, Mrs.———," he said, "it's the process that wears me out."

This it is—this terror of the process—which brings about those sudden attacks of apparent paralysis of all common sense with which every school examiner is familiar the moment he goes in the least outside of the prescribed course. No matter how kind and conciliatory he may be, or how gentle his approaches, it is easy for him at any time to throw a whole school into confusion by merely presenting a question in a perfectly simple form, sweeping away the prescribed approaches which have hitherto guided them. One of the most accomplished teachers and school examiners whom this country ever saw—the late Professor Alpheus Crosby of Dartmouth college, afterwards principal of the Salem, Massachusetts, Normal school—was never weary of insisting on this point, or of illustrating it from his own wide experience. He would say to a class, for instance, "Suppose you were to go out of the front door of this building and were to walk ten miles due north. Suppose you were then to turn round and walk three miles due south. How far would you then be from the schoolhouse door?" He solemnly declared that he had asked questions like that in school after school without finding a single pupil to answer them; and that if a scholar did answer it was very likely to be the poorest scholar in the class, who, from being such, had kept his mind out of the ruts, so that it worked naturally and untrammelled. Another favorite question of his was this: "Suppose you walked along the globe until you came to the equator, would there be anything to climb over or to step over?" and he declared that nearly all children would answer "Yes."

Some allowance is to be made, no doubt, for the natural caution of pupils

and the fear lest there may be a trap somewhere; but surely it should be one object in teaching to preserve that simplicity which does not fear a trap, or which will not imagine the existence of a trap where there is at most but empty air. It is to be noticed that these questions strike far deeper than any matter of mere knowledge and reach the action of the human mind itself. It is of comparatively little importance whether the child knows where Port Mahon or Cape Malabar is—two questions which I have found uniformly puzzling, not to pupils merely but to teachers—but it is of the greatest importance that he should have his wits about him and have a brain that works in a simple and natural way. One of the most rational examiners of whom I ever heard was that admiral in one of Marryatt's novels who, when examining a midshipman for promotion, described with vivid vehemence some terrible complication of winds and waves, and continued: "And now, Mr.———, supposing that at the very heigth of all this commotion of the elements the captain should suddenly send for you to the quarter-deck and should offer you a cigar, which end of it—mark me, sir! —which end would yon put into your mouth?" The amazed boy could only stammer out, "The little end, sir, if it was a Havana; and either end the same, if it was a cheroot!" I quote from memory and, not being myself a midshipman, I may have got the ends of the cigar confused, but the principle is plain. To know whether your young officer habitually has his wits about him and can meet the unexpected is more important than to know whether he can club-haul a ship.

In the delightful William Henry Letters, by Mrs. Abby Morton Diaz, the little boy demurs at being sent to dancing school, as his maiden aunts desire, in order that he may learn how to enter a room. "I told 'em" he plaintively said, "that I didn't see anything so very difficult about entering a room; I told 'em, walk right in!" It is this charm of simplicity, this habit of doing a thing in the natural way, which much of the mechanism of our schools represses. Instead of walking right into the truth, it must be administered in some artificial way. Everyone who visits schools may notice, for instance, that the boy who merely reads aloud his sum as propounded in the arithmetic, simply for the sake of knowing it, without the thought of elocution, will read it in a simple and natural way; but put that boy on the platform and give him "Spartacus the Gladiator" to declaim, and how instantly he will begin to mouth and rant! Not a tone of his voice, not a movement of his hand, will be natural; you rejoice when he is remanded to the arithmetic and becomes plain William Henry once more. A visitor once attending, by urgent solicitation, the graduating exercises of a school of elocution, was asked eagerly by the teacher for criticisms. "All I can say is," he said frankly, "that out of the twenty whom I have heard, there is only one whom I should be willing to have read to me if I were ill." This unexpected test evidently startled the teacher very much.

It is always to be borne in mind that, with whatever faults of method, the merits of our public schools are so very great that they will really bear any amount of criticism. All that their pupils learn, or do not learn, in the purely intellectual way is really secondary ot the fundamental virtues—punctuali-

ty, obedience, order, patience, cleanliness, self-control, application— which even the poorest of these schools is unconsciously impressing, day after day, upon pupils who often have no other opportunity of learning the least of these good gifts. As a rule, our public schools teach these things better than any private schools. On the other hand, the public schools have defects growing out of their merits—les defauts de ses qualites. Their enormous size and number render it almost inevitable that they should become machines. Where a dozed different grammar schools are all aiming at the same annual examination, for instance, the chance for individuality in a teacher is reduced almost to a minimum; every hour, almost every word, must be brought to correspond with the same hour and word in the grammar school in the next ward. Only very rare teachers or very rare superintendents can infuse the oxygen of fresh life into a mechanism so enormous; and it needs the constant criticism of the best friends of the public school system to keep it true to "kind nature's" methods. —*The Cosmopolitan.*

TEACHING ELEMENTARY SCIENCE.

W. MARRS.

THE teaching of elementary science in ungraded schools is one of the best means of developing thought and observation, awakening dormant minds, and creating a general interest. The purpose of this brief article is merely to give a few suggestions as to how the work may be presented to even quite young children. It is presumed that all teachers are conversant with the rudimental sciences. One caution, however; don't teach too much. Like dessert it is not intended to make a meal on. Remember that your mission is to set minds to thinking, and not to "fill them with knowledge." Use as many practical illustrations as possible. Suppose, for a general exercise next week, that we study

HEAT AND COLD.

1. Familiarize pupils with the law, "heat expands and cold contracts."

2. In the building of the St. Louis bridge one of the iron beams was found to be an inch or two too long. Ice was bound on it and after several hours it sank into position.

3. Get an iron ring of any kind, and a piece of iron that will just go through it. When heated it will not go through the ring.

4. Why does a clock run faster in winter than in summer?

5. Why is the space left between the ends of the rails on a railroad?

6. Why are wagon-tires put on loose? Why do some tires have to be "set" or "cut"?

7. What is the salt for in making ice-cream? Note that erroneous ideas exist regarding this. Speak of the affinity or "thirst" of salt for water, also that melting ice is colder than ice.

8. How is dew formed? Explain this and the "sweating" pitcher together. Why does not much dew form on a windy or cloudy night?

9. Why do we blow our hands to make them warm, and our soup to make it cool? Does a fan cool the air?

10. Why does sprinkling the floor cool the room? Explain how heat and moisture form vapor. Why does it rise? What does it form? Explain that the only difference between clouds and fogs is in their elevation.

11. In illustration of some of the above, speak of putting a lighted paper under an inverted cup and how it draws the water up.

12. Make hygienic suggestions when opportune. Why ventilation is best at the top of windows; why it is not healthful to sleep on the floor?

13. Ice sometimes forms on the desert of Sahara. The air becomes so dry as to let the heat escape and ice is formed. This is one of the principles in the production of artificial ice. Why is it cold on mountains? Speak of the temperature in ascent and vice versa.

14. Ice melts under *pressure* as well as under heat. Let a bar of ice be supported at each end by blocks. Pass a broom wire around the center and suspend a weight of 15 lbs. The wire will gradually work its way through the ice and the crevice be frozen up again as fast as melted.

15. Why does the snow keep the grass green? Snow reflects heat but absorbs little. Light colors absorb less and reflect more than darker ones. Talk about "cool" and "warm" colors of clothing.

16. What causes wood to snap when put on the fire? *Ans.* The escaping of the air cells as they are expanded by the heat. In like manner a bladder is distended when held near the fire. What kind of wood crackles most?

17. An egg may be cooked on a paper laid flat on the stove and the paper only slightly burned. Why is this.

18. What are the sources of heat? What is a thermometer? Analyze the word. Bring one to school and have children explain its use.

—*School News.*

EDUCATIONAL PICTURES IN LITERATURE. I.

HUBERT M. SKINNER.

POPE. Alexander Pope, the greatest poet of the "Augustan Age" of English literature (the age of Queen Anne), was born in 1688, near Windsor, in England. In youth he exhibited remarkable precocity as a student and writer. While in his twelfth year, he wrote his "Ode on Solitude", which is still read and admired. At sixteen he wrote "Pastorals", and at eighteen "The Messiah", both fashioned after classic models, the last named being a close imitation of Vergil's *Pollio*. Other brilliant successes in poetical composition followed in quick succession, and Pope became the reigning favorite in letters, amazing all by the flash of his burnished couplets and the splendor of his effects. Critics he had, and upon them he wreaked unexampled vengeance, hurling against them his terrible satire, the "Dunciad", which "fell among his opponents like an exterminating thunderbolt." He translated Homer's *Iliad* and *Odyssey*, and wrote a didactic poem the "Essay on Man", which supplied a large number of sententious proverbs, current in the present day. His "Rape of the Lock", a mock-heroic composition, and the "Essay on Criticism", among his earlier poems, are among his best.

Pope was never married. He exhibited in his personal character the traits of

a spoiled child. His whole life was a struggle against disease. He was ever the petted boy of a proud and indulgent mother. He died at his country seat "Twickenham", near London, in 1744.

Extracts from "The Dunciad,"[1] *Book IV.*

ARGUMENT.[2] The poet * * * shows the Goddess ("Dullness," the daughter of Chaos and Night) coming in her majesty to destroy order and science, and to substitute the kingdom of the dull upon the earth. How she leads captive the sciences, and silenceth the muses: and what they be who succeed in their stead. All her children, by a wonderful attraction, are drawn about her and bear along with them divers others, who promote her empire by connivance, weak resistance, or discouragement of arts; such as half-wits, tasteless admirers, vain pretenders, the flatterers of dunces or the patrons of them. All these crowd around her; one of them, offering to approach her, is driven back by a rival, but she commends and encourages both. The first who speak in form are the Geniuses of the schools, who assure her of their care to advance her cause *by confining youth to words, and keeping them out of the way of real knowledge.* Their address, and her gracious answer, with her charge to them and the universities. The universities appear by their proper deputies, and assure her that the same method is observed in the progress of education.

—From Pope's Argument to the Fourth Book.

Now flamed the dog-star's unpropitious ray,
Smote every brain, and withered every bay;
Sick was the sun, the owl forsook his bower,
The moon-struck prophet felt the madding hour:
Then rose the seed of Chaos and of Night,
To blot out order and extinguish light,
Of dull and venal a new world to mold,
And bring Saturnian days of lead and gold.
She mounts the throne; her head a cloud concealed,
In broad effulgence all below revealed,
('Tis thus aspiring Dullness ever shines,)
Soft on her lap her laureate son reclines.
Beneath her footstool, Science groans in chains,
And Wit dreads exile, penalties, and pains.
There foam'd rebellious Logic, gagg'd and bound,
There, stript, fair Rhetoric languished on the ground;
His blunted arms by Sophistry are borne,
And shameless Billingsgate her robes adorn.
Morality, by her false guardians drawn,
Chicane in furs, and Casuistry in lawn,
Gasps, as they straiten at each end the cord,

1. The title is imitated from Homer's "Iliad" (from the city of Ilium, or Troy), Vergil's "Aeneid" (from Aeneas, a Trojan hero), Camoens' "Lusiad"—the Portuguese epic [from Lusus, the fabled founder of Lisbon], etc.

2. Abstract of the book; a term applied to the synopsis which generally precedes each book of a heroic poem.

And dies, when Dullness gives her Page[3] the word.
Mad Mathesis[4] alone was unconfined,—
Too mad for mere material chains to bind,
Now to pure space lifts her ecstatic stare,
Now, running round the circle, finds it square.
But held in tenfold bonds the Muses lie,
Watched both by Envy's and by Flattery's eye.
There to her heart sad Tragedy addrest
The dagger wont to pierce the tyrant's breast;
But sober History restrained her rage,
And promised vengeance on a barbarous age.

* * * * * *

The gathering number, as it moves along,
Involves a vast, involuntary throng,
Who, gently drawn, and struggling less and less,
Roll in her vortex, and her power confess.
Not those alone who passive own her laws,
But who, weak rebels, more advance her cause.
Whate'er the mongrel no one class admits,
A wit with dunces, and a dunce with wits.
Nor absent they, no members of her state,
Who pay her homage in her sons, the great;
Who, false to Phoebus[4] bow the knee to Baal[5],
Or, impious, preach his word without a call.
Patrons, who sneak from living worth to dead,
Withhold the pension, and set up the head; [6]
Or vest dull Flattery in the sacred gown;
Or give from fool to fool the laurel crown.

* * * * * *

When Dullness, smiling—"Thus revive the wits!
But murder first, and mince them all to bits;
Let standard authors, thus like trophies borne,
Appear more glorious as more hacked and torn;
And you, my critics! in the chequer'd shade,
Admire new light through holes yourselves have made.
Leave not a foot of verse, a foot of stone,
A page, a grave, that they can call their own;
But spread, my sons, your glory thin and thick,
On passive paper or on solid brick."

* * * * * *

Now crowds on crowds around the goddess press,

3. Judge Page—an English jurist always ready to hang the defendant.
4. Learning; a Greek word referring especially to mathematical science.
5. Phoebus and Baal, divinities of ancient mythology.
6. Neglect a starving genius while he lives, and erect a statue in his honor after his death.

Each eager to present the first address.
Dunce scorning dunce beholds the next advance,
But fop shows fop superior complaisance.
When lo ! a spectre[7] rose, whose index hand
Held forth the virtue of the dreadful wand ;
His beavered brow a birchen garland wears,
Dropping with infants' blood, and mothers' tears.
O'er every vein a shuddering horror runs ;
Eton[8] and Winton[9] shake through all their sons.
All flesh is humbled, Westminster's[10] bold race
Shrink, and confess the genius of the place:
The pale boy-senator yet tingling stands,
And holds his breeches close with both his hands.
Then thus[11] : "Since man from beast by words is known,
Words are man's province, words we teach alone.
When reason, doubtful, like the Samian letter,[12]
Points him two ways, the narrower is the better.
Plac'd at the door of learning, youth to guide,
We never suffer it to stand too wide.
To ask, to guess, to know, as they commence,
As fancy opens the quick springs of sense,
We ply the memory, we load the brain,
Bind rebel wit, and double chain on chain;
Confine the thought, to exercise the breath,
And keep them in the pale of words till death.
Whate'er the talents, or howe'er design'd,
We hang one jingling padlock on the mind."

* * * * * *

"O (cried the goddess) for some pedant reign !
Some gentle James, to bless the land again;[13]
To stick the doctor's chair into the throne,
Give law to words, or war with words alone,
Senates and courts with Greek and Latin rule,
And turn the council to a grammar school !
For sure, if Dullness sees a grateful day,
'Tis in the shade of arbitrary sway.
O! if my sons may learn one earthly thing,

7. A representative of the schoolmasters.

8, 9, 10. Famous English schools.

11. The word *says* is here omitted, as is frequently the case in epic poetry.

12. The Greek Upsilon, represented graphically in the English alphabet by Y. In the school of the Samian Pythagoras it was made the symbol of the parting of the ways—of the choice between virtue and vice.

13. James I. of England and VI. of Scotland, who was so famous for his pedantry that politicians sought to gain his favor by purposely committing blunders, which gave their royal master an opportunity to display his learning by correcting them.

Teach but that one, sufficient for a king ;
That which my priests, and mine alone, maintain,
Which, as it dies or lives, we fall or reign ;
May you, may Cam, and Isis preach it long !
The RIGHT DIVINE of Kings to govern wrong."

* * * * * *

"Mistress! dismiss that rabble from your throne!
Avaunt—is Aristarchus[14] yet unknown—
Thy mightly scholiast, whose unwearied pains
Made Horace dull, and humbled Milton's strains?
Turn what they will to verse, their toil is vain;
Critics like me shall make it prose again.
Roman and Greek grammarians! known your better;
Author of something yet more great than letter;
While, towering o'er your alphabet, like Saul,
Stands our Digamma,[15] and o'ertops them all.
'Tis true, on words is still our whole debate,
Disputes of *me* or *te*, of *aut* or *at*,
To *sound* or *sink* in *Cano*, *O* or *A*,
Or give up *Cicero* to *C* or *K*.[16]

* * * * * *

In ancient sense if any needs will deal,
Be sure I give them fragments, not a meal.
What Gellius[17] or Stobæus[18] hash'd before,
Or chewed by blind old scholiasts o'er and o'er.
The critic eye, that microscope of wit,
Sees hairs and pores, examines bit by bit:
How parts relate to parts, or they to whole.
The body's harmony, the beaming soul,
Are things which Kuster[19], Burman,[19] Wasse[20] shall see,
When man's whole frame is obvious to a flea.

* * * * * *

See! Still thy own, the heavy cannon roll,
And metaphysic smokes involve the Pole.
For thee we dim the eyes, and stuff the head,
With all such reading as was never read;
For thee explain a thing till all men doubt it,
And write about it, Goddess, and about it.
So spins the silk-worm small its slender store,
And labors till it clouds itself all o'er.

14. The representative of the universities at the Court of Dullness.
15. A tall letter of the Ancient Greek alphabet resembling the English F.
16. Alluding to the different pronunciations of Latin.
17. A minute critic.
18. The writer of a common place book made up of clippings from old authors.
19. 20. Learned critics.

What though we let some better sort of fool
Thrid every science, run through every school?
Never by tumbler through the hoops was shown
Such skill in passing all, and touching none.
He may, indeed (if sober all this time),
Plague with dispute, or persecute with rhyme.
We only furnish what he cannot use,
Or wed to what he must divorce, a muse ;[21]
Full in the midst of Euclid[22] dip at once,
And petrify a genius to a dunce.
Or, set on metaphysic ground to prance,
Show all his paces, not a step advance.
With the same cement, ever sure to bind,
We bring to one dead level every mind.
Then take him to develop, if you can,
And hew the block off, and get out the man.[23]

21. One of the nine goddesses of the Greeks and Romans, fabled to preside over literature, science, and art.

22. A famous mathematician of antiquity.

23. Alluding to the odd conceit of an ancient sculptor, that every block of marble already contains an exquisite piece of sculpture, which requires only that the marble confining it shall be removed.

SIGMA PI MATHEMATICAL ASSOCIATION.

QUERIES.

70. Determine the equation of the locus of the center of the circle with radius r, tangent exteriorly to the ellipse $b^2x^2+a^2y^2=a^2b^2$.

71. Find the value of x, y, and z in the following equations:

$cx+y+az=a+ac+c$
$c^1x+y+a^1z=3ac$
$acx+2y,+acz=a^1+2ac+c^1$
(Robinson's Elementary. Ex. 13, Page 157.)

ANSWERS.

48. Let us assume \$25 to be the list price of each set of books

10 and 5 off $=14\frac{1}{2}\%$ off and $100\%-14\frac{1}{2}\%=85\frac{1}{2}\%$
20 " 10 " $=28$ " " " 100 "-28 " $=72$ "
20 " 5 " $=24$ " " " 100 "-24 " $=76$ "
25 " 10 " $=32\frac{1}{2}$" " " 100 "$-32\frac{1}{2}$" $=67\frac{1}{2}$ "

\$25 × 855 = \$21.375, assumed cost of 1st set of books.
\$25 × .72 = \$18, assumed cost of 2nd set of books.
\$25 × 76 = \$19, " " " 3rd " " "
\$25 × .675 = \$16 875, " " " 4th " " "
\$21.375 × 1.10 = \$23.5125, assumed selling price of 1st set of books.
\$18. × 1.10 = \$19.80, assumed selling price of 2nd set of books.
\$19. × 1.20 = \$22.80, assumed selling price of 3rd set of books.
\$16 875 × 1.25 = \$21.09375, assumed selling price of 4th set of books.

\$23.5125 + \$19.80 + \$22 80 + \$21.09375 = \$87.20625, assumed selling price of the four sets of books.

But the actual selling price was \$200.

∴ Our assumed price is $87\frac{200}{20625}$ or $2\frac{4094}{13953}$ times too small, whence by multiplication we find the following results.

\$57.335 = list price of each set of books.
\$49.022 = cost of 1st set of books.
\$41.281 = " " 2nd " " "
\$43 647 = " " 3rd " " "
\$38 701 = " " 4th " " "
\$53.924 = selling price of 1st set of books.
\$45.409 = " " " 2nd " " "
\$52.370 = " " " 3rd " " "
\$48.376 = " " " 4th " " "

\$53 924 ÷ .90 = \$59 93, marking price of 1st set of books.

\$45.409 ÷ .80 = \$56 762, marking price of 2nd set of books.

$52.376÷.80=$65.462, marking price of 3rd set of books.

$48.376÷.75=$64.502, marking price of 4th set of books.

$49.022+$41.281+$43.647+$38.701=$172.651, cost of the four sets of books.

$200−$172.651=$27.349, amount of gain.

$172.651=100 per cent.

$$\$1=\frac{1}{1.72651}\text{ per cent.}$$

$$\$27.349=\frac{27.349}{1.72651}\text{ per cent.}=15\tfrac{4}{9}+\text{ per cent.,}$$

gain in per cent. L. I. Knowlton.

62. This is a problem of double integration.

1. Let R = radius of log and well.
2. Then $x^2+y^2=R^2$=equation of well.
3. $y^2=R^2-x^2$
4. $y=\pm\sqrt{R^2-x^2}$
5. $x^2+z^2=R^2$=equation of log.
6. $z=\pm\sqrt{R^2-x^2}$
7. $V=\int\int z\,dx\,dy$
8. $=\int_{+R}^{-R}\int_{+\sqrt{R^2-x^2}}^{-\sqrt{R^2-x^2}}\pm\sqrt{R^2-x^2}\,dx\,dy.$
9. $=\int_{+R}^{-R}(2R^2-2x^2)dx$
10. $=\int_{+R}^{-R}(2R^2\,dx-2x^2\,dx)$
11. $=\left\{4R^2x-\frac{4}{3}x^3\right\}_{-R}^{+R}$
12. $=\frac{8R^3}{3}$ for vol. of ½ of log.
13. $\frac{16R^3}{3}$=vol. of log.
14. Substituting $\frac{5}{2}$ for R we get
15. V=83.33⅓ cu. ft. C. M. Jansky.

63. Let n=number of courses in the pile.

Let l =length of lower course.

Then, sum $=\frac{1}{6}n(n+1)(3l-n+1)$

Substituting,

$$\text{Sum}=\frac{10(10+1)(72-10+1)}{6}=\frac{10\times11\times63}{6}=1155$$

∴ The pile contained 1155 shot.

J. D. French.

64. The Sturmian functions of the given equation are :

$x^4+4x^3+3x+27$

$4x^3+12x^2+3$

$4x^2-3x-35$

$-65x-179$

$-R$

By examining these functions we find that there are no real positive roots, but two real negative roots. These real roots lie between −2 and−3, and −3 and −4. E. J. Fermier.

65. The solution of this question depends upon another condition; namely, the shape of the field. In this solution we assume the field to be square.

Let x = no. of rods on each side of the field.

Then, $\frac{x^2}{160}$ = no. of acres contained.

And, 4(20x)= no. of rails in the fence.

$$80x=\frac{x^2}{160}$$

$$\frac{x}{160}=80$$

$x=12800.$

$\frac{x^2}{160}=1024000$, no of acres contained

= no. of rails in fence. E. J. Fermier.

67. Let 3x=width of the rectangle.

Let 4x = length of the rectangle.

$12x^2=1472$

$x^2=122\frac{2}{3}=\frac{368}{3}$

$x=\sqrt{\frac{368}{3}}=11.0755$

3x = 33.2265, width.

4x = 44.302, length. E. J. Fermier.

68. The present worth of 13 cts due in 8 mo., without interest, when money is worth 6 per cent. is 12½ cts. 12½ cts.−12 cts. = ½ ct., loss by selling for cash.

12½ cts. =100 per cent.

$$1\text{ ct.}=\frac{1}{12\frac{1}{2}}\text{ of 100 per cent.}=8\text{ per cent.}$$

½ ct. = ½ of 8 per cent. =4 per cent, loss in per cent. by selling for cash.

The amount of 12½ cts. for 60 days at 6 per cent. = 12⅝ cts.

12⅝ cts. − 12 cts. = ⅝ ct., loss.

12⅝ cts.=100 per cent.

$$1\text{ ct.}=\frac{1}{12\frac{5}{8}}\text{ of 100 per cent.}=\frac{800}{101}\text{ per cent.}$$

⅝ ct. $=\frac{5}{8}\times\frac{800}{101}$ percent. $=4\frac{96}{101}$ per cent., loss by keeping goods 60 days then selling for 12 cts. J. D. French.

69. The equation of any tangent to the ellipse is, 1. $y=mx+\sqrt{a^2m^2+b^2}$

The equation of the tangent at right <s to (1)

2. is $y=-\frac{1}{m}x+\sqrt{\left\{\frac{a^2}{m^2}+b^2\right\}}$

Clearing (2) of fractions and transposing in both (1) and (2), we get,

3. from (1) $y-mx=\sqrt{a^2m^2+b^2}$

4. and from (2) $ym+x=\sqrt{a^2+b^2m^2}$

Adding the squares of (3) and (4)together, and dividing by the factor $(1+m^2)$, we get,

5. $x^2+y^2=a^2+b^2$, which is the locus required. Hence, its locus is a circle with its center at the origin and $\sqrt{a^2+b^2}$ for its radius. See Bowser's Analytical Geometry, p 141, and O'Brien's Co-ordinate Geometry, p. 118.

C. M Jansky.

The following additional credits are due : L. I. Knowlton, 50, 52, 54 and 55; E. J. Fermier, 69; J. D. French, 65 and 67; G. T. Cass,63,65, 97 and 69.

ORATION AT THE DEDICATION OF NEW COLLEGE BUILDING.

GOV. IRA J. CHASE.

(Reported for THE STUDENT.)

IT has been my intention to uncover not less than a hundred pages to you to-night, but my friends have said "don't do that; speak out from the shoulder". I do not know what that means. Probably they have pugilists in this school.

So I find myself something like the captain who asked the pilot if he could run the boat safely, and the pilot said he thought he could. Said the captain, "Until I come on deck again sail by that star." The captain was gone longer than the pilot supposed he would be. When he returned he said, "Captain, you will have to give me another star; I have sailed past that one." And so I have got to sail, after spending some very anxious hours in the preparation of something that I thought would be just and fitting to this occasion, by another star, or shift my bearings in a measure to say the least. But I am glad to be with you. It is a greater occasion than I had supposed it would be—this magnificent presence—but it is just about what anybody might expect from the grand old Hoosier State. Why if I were to rise to-morrow morning and ride upon the waves of light with more than the fleetness of the wind there would be no civilized clime but where I would find before me, years before me, the native Hoosier. If I were to visit the great nations of the earth I would find Indiana represented everywhere. Her statesmen are second to no statesmen in the world, so far as those are concerned who have been representing us in the nation, and long ago we stopped girdling presidential timber, for we did not know which one might be the very one we might want to save.

Indiana has never been disgraced previous to 1892 by her statesmen. Her prosperity has been perhaps paralleled, but not surpassed. And so I ought not to be surprised when I look upon this vast concourse of people and only this moment learn that it is a paid audience, never dreaming but what it was a spontaneous audience gotten up on a special occasion on this stormy night. And when I remember that this school started less than a score of years ago with thirty-five pupils, I ask myself the question, "What hath God wrought?" It is amazing, and for a private enterprise is absolutely without parallel in the annals of time. Our fathers builded wisely and well, laying the foundation of Harvard College, in eighteen years after, amid December snows, the Pilgrim fathers knelt on Plymouth rock; but thanked God that they had at last anchored where they could worship God according to the dictates of their own conscience with none to molest or make afraid. They knew that to bring out the highest citizenship and the very best and noblest civilization they must not fail to rear the school house by the side of the meeting house. Thus they acted, thus they builded and we have come now to the glorious inheritance of such

fathers' parentage, for which we ought to thank God and take courage. And when we remember that the educational institutions of this land are so numerous that we have hardly time to catalogue them; and when we remember that the Capital of Indiana is situated within a circle with a radius of seventy-five miles in which are twelve institutions of learning that will compare favorably with any other twelve that may be selected in any quarter of the world, we ought to be proud. And if we stretch that radius for a hundred and fifty miles I question whether any other state in the union, any other thirty-five thousand square miles, could show as many students as the State of Indiana, wending their way every morning to the fountains of knowledge in order to satisfy their insatiable desire to know what is going on in the world, and to fit and qualify themselves for the duties and activities of life. Therefore, again I say I am gratified in being able to fill this engagement and meet with you upon this certainly auspicious occasion.

We must not forget, however, that there are duties and responsibilities that are attached to every individual that do not begin and end with our existence or with our individual lives. Two thousand years ago the people from whom we sprang were barbarians. When Julius Caesar drew up his army on the banks of the Rhine, it was to find as dense a forest as Livingston or Stanley found in the Dark Continent. It was to find a people living out of doors, and in the rudest way, and as cruel to each other as they were to an opposing foe. We can understand then what two milleniums have brought us by the vigor and force and power of Christianity. Again we cannot help but ask the question, "What hath God wrought?" We ought not to forget in our scheming, in our intense desire for learning, that there is a wisdom that cometh from above. No matter how well equipped a man may be for the duties of life in the narrow circle in which he may move his life will be at last a failure unless he seeks wisdom from that fountain from whence all true wisdom flows. Christianity never has been a barrier to the advancement of science. It has always been in the lead. If you enjoy the surroundings of a Republic like ours it is because a Christian civilization brought it to your hearths. It was not civil liberty that gave the world religious liberty, but it was religious liberty that gave this country, at least, the principles upon which the government rests to-night. Where no conviction is, where no revolution is, the people perish. There never can be a truer declaration. If we are to neglect the spiritual, we may fatten the intellectual all we please, we will write upon it with our own hand that "life has been a failure." We shall pronounce judgment upon ourselves.

It is not a sermon that I am going to deliver to you neither shall we take up a collection for the purpose of, in any sense, repaying for the remarks that have been made in this direction. But I am anxious, when I stand before an audience like this, I am anxious to leave no uncertain sound ringing in the ears of the multitude. I know that in a few years at most my eyes shall close upon the scenes of earth. I know—I do not believe—I *know* that in the distant future I must stand before the great Judge of the universe and render an account of my stewardship. There is no ambition standing in my way that shall ever keep me silent with regard to the outcome of

the human race as I understand it from the revealed will of God.

I have seen much of life. I am beginning to think of the time, in less than twenty years, when I shall call myself, if I live, three score years and ten. I am not anxious to arrive at that period and feel that I have neglected my duty. It has been my privilege to have been thrown among the educated and the cultured. You may believe that I have learned too little from the advantages that have come to me; but I have heard individuals talk as if they knew all about everything. God has given man a desire to know, and God be praised that he has so conformed us in body, soul and spirit that this desire can grow in our hearts and we can feed this longing desire as we can feed the body when it is hungry, or slake its thirst when it is thirsty.

But how little we know when we talk about the universe. Why, Brother Brown don't know it all, and he knows a thousand times more than I do. (Laughter.) You did not wait until I got through. I meant about running a Normal School. (Laughter) But he does not know anything at all about the universe. There is not a man in the world who knows anything about the universe. We speak that word trippingly; sometimes write it with a capital letter and sometimes we don't. It is according to the way in which we look at the word. But when I remember that the astronomer makes what he calls a sweep of the heavens and of the "milky way" and traverses into countless systems like that of which our world forms a part, then, my friends, he begins to realize that he knows very little about space; and that word "Universe" comprehends all that is above, all that is around and all that is beneath, and the further we penetrate what we call space the more we see and the less we know about it. It seems strange to me that a man should say that if he should make a world he would do it thus and so. He does not know how little a man he appears in my eye. He does not know how small he is in the sight of the Almighty, and that Gabriel would have to use a microscope to find his soul in the day when souls would be asked to come up to the great judgment. The word "Universe"—let us stop a moment. Why we are on a speck of sand as compared with the sun. We are told it is about like the head of a small pin as compared with an orange. Who knows about this world? What geologist can look further than into the depths of the grave, and what astronomer can look further than the fixed stars when he tells us that there are more than seventy-five million suns like this system of which our earth forms a part. When I remember that I do not know the people of this world, and we cut it up into continents; we cut the continents up into nations, and the United States into states, and the states into counties, and the counties into townships, and the townships into school districts,—now let somebody stand up and tell me he knows something of every man, woman, and child in his school district. And he knows all about the universe! Fourteen hundred millions of human beings on the face of the earth and the mere fact that we can tell this, and how far distant we are from the sun, then we are going to tell the Almighty how he should have builded, and how he should not have builded! As one man said "If I were going to make a world it would not have any bed bugs in it." That is about as

far as a real smart man, that does not believe in God, could get. You can smell him as far as you can the detested insects.

Now, I want to call your attention to the fact that we are living in an age of progress, of learning, and that Christianity has always gone in advance. I do not believe that I hazard anything when I repeat the language of a philosopher who, thank God, still lives: "There was never a great discovery in the heavens above, nor scarcely one in the earth beneath, that was not discovered by a preacher or a preacher's son." And yet you undertake to say that Christianity is a stumbling block in the way of progress. It was Christian gold that laid the foundation of colleges everywhere in this land. It was Christian gold that builded wisely and well the hospitals and orphan asylums and the private enterprises. It is not the money that has been raised through the avenues of skepticism that has blessed the pathway of mankind. All the skepticism of the nation could not save one institution in Boston named after Tom Paine from being sold out under a mortgage. And so I repeat, if we are to have a higher development of civilization, of noble manhood and womanhood, it must be laid deep in the foundations of truth that were never born in the mind of man. It must be a wisdom that rises above us for no stream can ever rise higher than its source. I remember very well that it has been said in the ways of life we are constantly meeting with obstacles. I am delighted to know that there may be some obstacles met and conquered.

Ours is an age of progress. Never in the history of the world has man been so industrious as we find him to-day. In intense devotion to public and private business, the country in which we find our home excels any other on the globe.

When we try to trace our ancestry we are lost in the dense forests that once covered the unknown German country, and see the hardy race from whence we sprang seated naked beneath the German oak, free, warlike even to the point of exterminating themselves. The Phœnicians had invented letters, navigated the waters of the then known world, established colonies in Africa, and even on the continent of Europe—Germany was unknown. When Egypt possessed learning and permitted Greece to rob her of her laurels and adorn the earth with grace and beauty, with pen and chisel; and when Rome was in the height of her power, and her despotism had run through all the arteries and veins of that ancient civilization, your ancestors, naked and wild, roamed at will in forests as dense as those of Africa and as difficult to penetrate. It is not my purpose to pursue this line of thought farther than to say for all our drawbacks, in the late start apparently made in the race of life, we bear comparison with the Rome, Greece, Egypt and Phoenicia, of to-day. The center of the broadest learning, of the deepest thought, is now where the wild beasts roamed at will, hunted by the scarcely less savage men. Their descendants in the old world are staid, slow, hardy, methodical, patient, industrious, and thorough. Those in the new world are impetuous, progressive, inventive, utilitarian, patriotic, full of love as well as adventure, and known as the all-around nation of modern time.

You, my friends, have come into the blessedness of both worlds. The best

thought pays you tribute. You are in the rounding up of the 19th century, favored beyond measure. It is only by contrast that we can realize our opportunities and blessings.

We wish to remember those with whom we have been intimate for the good which we have received at their hands. Turn back the leaves of memory and witness for yourselves. What class in society has been the most help to you? If your companions have not been benefitted by you, or you by them, they have been obstacles in your path of progress. Avoid them in the future.

Would Livingstone have interested the Christian nations in his behalf but for his supreme faith in God? Who was Stanley before he met the greatest explorer of the age in Darkest Africa? In finding Livingstone he found through him the Savior of men. It was a long step from the poor-house in Wales to the position in the hearts of good and thoughtful men throughout the world. The famous lecturer never touched the responsive chords of the hearts of the listeners more tenderly that when in closing his lectures he remarked "The children now living would know of millions of the Dark Continent rejoicing in Him of whom the angels sang, 'Peace on earth, good will to men'.

Stanley never wearies of speaking of Livingstone, who set in motion a train of thought that rearranged his entire being; not by silvery speech, nor by unanswerable argument; not by persuasive rhetoric, nor by the waving of a magic wand. It was by power divine; at least a power borrowed from heaven that gave the intellectual giant, with a heart as brave as the bravest, a life so sweet, so humble, so angelic, that the brutal savage and the cultured Caucasian fell at his feet. Not to worship, but to adore the God whom Livingstone adored. [*Concluded next month.*]

ASTRONOMICAL NOTES FOR JUNE.

W. J. Hussey.

FOR several months Venus has been an interesting object in our western sky. It has been continually increasing in brightness and on June 2, will attain its maximum brilliancy. It will then be visible to the naked eye in the day time as has been the case during May. Those who have good eyes and know exactly where to look for it may easily find it.

The planet is at present rapidly approaching the sun and will be at inferior conjunction with it July 9. It will then be between the earth and sun. As it approaches this position, its illuminated side will, more and more, be turned away from the earth. At the beginning of June about 25 per cent. of the illuminated portion will be turned towards the earth, at the end of the month only about 3 per cent. It will then appear in telescopes as a very narrow crescent, much like that of the moon when a day or two old. At the end of the month, it will be near the sun and cannot be observed to advantage except in the day time. During the early part of July it will be invisible on account of its nearness to the sun. When it again becomes visible it will be as a morning star, and it will continue a morning star until next April.

Mars is slowly coming into better position for observation, both on account of its rising earlier in the night and on account of its decreasing distance from the earth. During June it rises not far from 11 P. M., passes the meridian about 3:30 A. M., and sets about 8 o'clock in the morning. It is in the constellation Capricorn, being the most brilliant object in that part of the heavens. It will be interesting to watch the motion of Mars among the stars from June until October. During June the planet will move eastward among the stars, during July and August westward, and then eastward again. During the four months from June 1, it will describe a large loop in the constellation Capricorn and will then move rapidly in nearly a straight line across the constellations Aquarius and Pisces. At the end of the year the planet will be in the latter constellation. The opposition of Mars this year is particularly favorable on account of its nearness to the earth. It is not since 1877 that it has approached so near. It is hoped that the observations which will be made this summer will throw much light on the many unsettled questions concerning its physical condition and also that accurate data may be obtained for a more precise determination of the solar parallax, or in other words, of the earth's mean distance from the sun.

Jupiter is a morning star. For some time this planet has been too near the sun to be seen, but now the distance has increased so much that it may be seen fairly well for an hour or two in the morning. Jupiter will be in conjunction with the moon on the morning of June 19. The moon will pass about a degree north of the planet.

Saturn is now in good position for observation. During the evening hours of June, the planet may be found in the south-west about one-third of the way from the horizon to zenith. The rings still have their edges nearly toward the earth so that they cannot be seen to advantage. They will begin to open somewhat in the latter part of June and from that time on will come into better position for seeing them. Saturn's disc is crossed by faint dusky markings parallel to its equator, and so faint that they can be seen only with large telescopes. Some spots were seen upon the disc last year but none have been reported this year, at least none of sufficient distinctness to enable the rotation period of the planet to be determined from them.

Uranus is in the constellation Virgo and is moving slowly westward among the stars. It is between Spica the principal star of the constellation and the fifth magnitude star.

Neptune is near the sun and cannot be seen. Mercury is also near the sun.

Winnecke's periodic comet is moving south-west across the constellations Ursa Major and Leo Minor. It has increased in brightness very much since the time of its discovery and during June will further increase in brightness about 12 times. It will be easily visible with small instruments and possibly to the naked eye towards the end of June.

The following are the positions of some of the constellations and brighter stars for 9 P. M., June 15:

Bootes is in the zenith. The Northern Crown is east of it and Berenice's Hair, west. The brilliant star Arcturus is in Bootes. Virgin is south of Berenice's Hair. The Crow, characterized by a prominent quadrangle is south of the Virgin. Leo is in the south-west near the horizon; Regulus is its brightest star. The Twins, containing Castor

and Pollox, is in the north-west. To the east of the northern Crown is Hercules and still further to the east the Lyre. Vega, one of the most brilliant northern stars, is in the Lyre. The Swan is north-east of the Lyre and is easily distinguished by the large northern Cross.

BAD SITTING AND STANDING POSTURES.

Extract from a lecture by Dr. J. H. Kellogg.

(Reported for The Student by Helen L. Manning.)

THE position generally assumed in sitting is dangerous to health; it tends to induce various physical deformities. The muscles are relaxed, the shoulders rounded, the chest flattened and hollow and the spine is bent outward like a bow. These deformities do not exist among the savages who have no chairs to sit in but who lie down when they want to rest. The way to sit in a chair so as not to foster these deformities, is to let the hips come well to the back part of the chair while the shoulders are supported above, which is very different from putting the hips on the front of the chair and bowing the back all the way to the neck. The most serious effects of bad sitting positions are upon the internal organs which are snugly packed in their respective cavities like articles in a well packed trunk. When the muscles are strong, tense and vigorous, every organ is held securely in its proper place; but when the muscles are relaxed and the body distorted into unnatural, unhealthful positions, very serious injuries and displacements are liable to take place in the internal viscera.

It is physiologically wrong and harmful for a person to sit or stand in a relaxed position; the muscles should always be energized except when one lies down for rest or sleep. When a horse is strong and vigorous, he puts energy into every muscle; but when he is tired and exhausted, his head hangs down, his muscles are all relaxed and there is no curve in his spine. It is just the same with human beings, only unfortunately, human beings sit and stand in this relaxed, weak position when not tired. School boys and girls of ten stand in a relaxed lackidaisical way, first on one foot and then on the other, and when long continued, this produces curvatures of the spine. Not long ago, I was invited to a certain college to examine the students with reference to gymnastic work. Out of the seventy-three young ladies, between the ages of eighteen and twenty years, whom I examined, there were only four who did not have lateral spinal curvature. When the right shoulder is down, that means spinal curvature on the left side and conversely when the left shoulder is down. In some of these cases, I found two curves in the spine. Now these curves were mostly the result of bad attitudes in sitting, standing or walking, but bad sitting postures are more demoralizing than either bad standing or bad walking.

It is bad position while sitting at the sewing machine that does the mischief rather than the treadle movement. This is specially the case when the muscles of the waist are bound down with tight corsets or waist bands which crowd the

internal organs out of place; then the muscular effort required, produces the worst possible results. If a woman sits at a sewing machine with her muscles energized and her dress sufficiently loose to give perfect muscular freedom and will use first one foot and then the other on the treadle, it is not likely that her health will suffer.

NOTES:—SCIENTIFIC AND OTHERWISE.

Scientific Kite Flying.

A novel expedition led by Dr. J. Woodbridge Davis was made recently to desolate little South Brother Island, in Long Island Sound, to test, with gigantic kites, in a forty-five mile gale, the practical value of certain theories of Dr. Davis. A description of the kites and a full account of the experiments are here given from the N. Y. Sun: The kites that Dr. J. Woodbridge Davis had made had six corners. The sticks were as heavy as the heaviest lath, and were made of stout wood and with no attention to weight at all. He had three of these heavy sticks in each kite, fastened together in the centre by a screw, so that they could be opened out to the regulation shape of the kite-frame or closed up; and instead of using tissue paper as a cover he used oiled silk for some kites, and duck for others. The bridles were arranged much as the bridle of a small boy's kite, and there was a loop for the tail, which was of knotted clothes-line. The beauty of these kites was that when they were rigged they could be folded together and wrapped up, so that, with a moment or two of work, they would be ready for use again. When unfolded, each kite stood six feet when resting on the ends of two of its sticks. As South Brother Island is small, low, and flat, and has no screen of trees, the wind gets free sweep over its desolate acre or so of land, and threatens to lift the short, brown grass by the roots and blow it out over the water. When Dr. Davis and his party landed, the wind was blowing fully forty-five miles an hour—a cold, steady western wind, in which no kite of the schoolboy pattern could have lived a minute. Dr. Davis and the young men of the Woodbridge school set to work to putting down the reels, which were more like windlasses. There were two of these reels, and upon each was wound several thousand feet of cod line, tested to stand a pull of seventy pounds. In order that the line might be paid out without becoming entangled in the frame of the reel, two pulleys were fastened to stakes a short distance in front of the reels, and a line was passed through each. When the reels and pulleys were all ready, a kite covered with duck was got out and arranged for flight. When the cod lines were fast to it, six young men held it aloft and at a signal let go of it. But the tail had got caught in some weeds and the kite dived, struck the ground, and lay there with a broken stick. Dr. Davis had had this kite rigged in a peculiar way to make some experiments. These experiments had to be abandoned, and an oiled-silk kite was made ready. Instead of bringing

all six strings from the upper and lower parts of the kite to a common center, and tying the strings to that as the schoolboys do, Dr. Davis had brought the three strings on each side together, and had the cod line from one reel tied at one junction and the cod line from the other tied at the other junction. In addition to these two lines, he had a lighter cord fastened to the top of the kite. This cord was to be paid out from a ball in his hands. The six young men held up the big oiled-silk kite and, at a signal, let it go. The reels spun around and the ball unrolled and the great kite rose straight in the air, its long tail of 200 feet of looped clothes-line hanging far below it. It went up and up and out and out until it was standing as though nailed up in the sky, far out over the water.

"Now, see the advantage of this line to the top of the kite," said Dr. Davis.

As he spoke, he pulled the line in. The kite rose still higher until the reel lines were almost perpendicular. Then Dr. Davis began paying out from the ball, and the kite began to drop and drop until the end of the tail was touching the water. The kite had moved neither to the right nor to the left. It had simply fallen straight and gently through the air. As soon as the doctor stopped paying out the line, the kite stopped falling, and remained stationary. Dr. Davis had its perpendicular motion under perfect control.

"Now, here is the advantage of having two reels," said he.

And he clamped the left-hand reel and began paying out line from the right-hand reel. As the right-hand line grew slack, the kite swept slowly around to the left, until it had described an angle of 55 degrees. Then Dr. Davis pulled in the right-hand line and paid out the left-hand line. The kite, obeying the new impulse, swept steadily back into the eye of the wind and then on to the right, until it had described an angle of 55 degrees in that direction. By slackening or tightening the top line, Dr. Davis could make the lateral motion in an upward or downward curve. The kite had been built for a forty-mile wind, and the lines were tested to bear that pressure. "The pull of this kite in a forty-mile wind," said Dr. Davis, "is more than a horse exerts when he draws a load weighing a ton over a level road. A horse pulling such a load is supposed to be pulling at the rate of about 100 pounds. The strain of this kite is over 140 pounds. I am afraid that the wind is too high and that the lines will break."

He had hardly done speaking before one of the lines did break, and the kite tumbled about and finally fell into the water. But it was uninjured, and as soon as the lines were retied it was let go again and rose high above the island, where several gulls were circling about trying to get at the meaning of the apparition that had come among them. Dr. Davis began to write letters in the air. He had just finished an O, which the kite lined out distinctly, when the line broke again, and the trials had to be abandoned.

Dr. Davis proposes to tie two of his kites to a small boat with a centreboard and make a trip on the Hudson. With the aid of the centreboard, he expects to go against the wind. If the wind is as high as thirty miles an hour he will get a speed of about fifteen miles an hour with the wind and two or three miles an hour against it. Aside from the additional sport, which having perfect con-

trol over one's kite gives, there is a practical side to these experiments. Many years ago it occurred to Dr. Davis that if a kite could be controlled it might be very valuable as an adjunct to life-saving apparatus. When a vessel goes on a reef or is helpless near the shore, the wind is nearly always dead on shore and blowing a stiff gale. Thus the life-saving stations have to shoot their lines out toward the helpless vessel with the disadvantage of a stiff breeze retarding the line, and with the further difficulty of the long and uncertain distance. Dr. Davis says that he has heard of several cases of shipwreck where the shipwrecked sailors had built kites and had tried to send a line on shore. But in none of these cases was there any success. But Dr. Davis thought the idea was a good one if a kite could be controlled. And it was this problem he set himself to solve. He experimented with various kinds of kites and with different ways of rigging their bridles. He also felt that if a vessel was to carry several of these kites their size would make them unwieldy. So he built a kite that could be folded up until it was almost as small as an umbrella. He now has the rigging arranged so that in any wind the kite is under control. In one of his experiments he sent a boat out into the river and then sent out his kite and lowered it so accurately that one of the men in the boat cut off a piece of the tail. Dr. Davis thinks that with the aid of a wind-gauge and an accurately determined reel, a kite could be held steady in even a gusty gale. A vessel could carry several kites of different build, to be used according to the violence of the wind. For very high winds, a frame of light steel might be used. A further advantage of the kite as a means of sending a line from a shipwrecked vessel to the shore or to a rescuing vessel, as against the sending of the line in the other direction, as the practice now is, would be the fact that the distance to which a kite can be flown is greater than the distance to which a line may be shot. Dr. Davis hopes that, as he gets further into the means of controlling kites, he may develop some way of long-distance signalling both for sea and land. He can make the kites write out letters in the air, and with a lantern tied to the kite at night the darkness need not interfere. To support a kite of any size a wind of at least twelve miles an hour is necessary, and such a wind would not always be available. But in cases of shipwreck the wind is almost always high.

Indian Miracles.

Ancient as well as modern descriptions of India which have told of the miraculous feats of the native fakirs have found but little credence in Europe and America, and their performances which seemed to belong to sorcery and witchcraft were always explained on the basis of prestidigitation. Recent scientific researches, however, have demonstrated that fraud and deception had no part in these wonderful performances, which cannot be explained, neither can they be denied. Tests made under the closest surveillance of the English authorities in India have shown that some of these fakirs possess the faculty of suspending the process of life for days, weeks, and even months, and to revive afterward, apparently unharmed, as if the progress of their existence had never been interrupted. These people caused themselves to be overcome by artificial stupefaction by inhaling the

smoke of certain narcotics and drinking certain kinds of wines. They were then placed in metal coffins, which were locked and sealed by the cautious Englishmen themselves, and buried about a foot under the ground. The graves were carefully guarded, and often months were allowed to pass before they were reopened. At that time the bodies showed but slight signs of animation and the minimum degree of bodily warmth. The companions of these fakirs called the apparently dead back to life, or rather to consciousness, and after a few hours' time they had entirely recovered and were as good as new. Experiments of this kind have been repeatedly made under the strictest control, excluding every possibility of fraud. Other Indian travellers reported that these fakirs were invulnerable and could absolutely not be wounded. This, too, was taken with a grain of allowance, until the audiences of the Panoptikum, at Berlin, have within the last few weeks had occasion to see for themselves. An Indian, Soliman Ben Aissa by name, is now making a trip around the world, engaged by the Caston Brothers, and will shortly appear also on the other side of the Atlantic. He has given his performances not only before public audiences, but before a narrow circle of physicians and anthropologists who came prepared to doubt and disbelieve. Soliman is rather a handsome man, well built and about thirty years old. He speaks French very intelligibly, and explains his productions as he goes along. He burned a powder in an open basin filled with live coals, and inhaled the smoke to put himself in condition for the experiments. He then took a number of large hatpins, such as ladies use for pinning their hats, and with them pierced his cheeks, his nose, his ears, and at last his throat, inviting the bystanders to convince themselves that the pins had really penetrated the flesh. No blood flowed from the wounds, unless it was especially desired, when the obliging Soliman would allow the blood to trickle from the wounds. For his second experiment the Indian used larding-needles. He bored one through his tongue, and then turned needle and tongue, until the latter appeared like a cork-screw. Then he bared his body and held a sharp sword against it, which he seemed to drive into the flesh with a wooden mallet. The skin, however, was not even cut, and only a little discoloration showed where the sharp edge of the blade had pressed his flesh. Another feat was simply harrowing. The Indian pierced his eye and lifted it out of its socket with one of the large needles so that it hung suspended by the nerve-threads about an inch from his cheek, balanced it on his finger, and allowed it to slip back again. In the face of such a wonderful feat his playing with poisonous serpents, which bit him, until he at last himself bit off one of the reptiles' heads and swallowed it, appear almost as of small consequence. In closing this wonderful exhibit of invulnerability he took a live coal from the basin, and placed it upon his bare arm. When at the end of ten minutes he removed the coal, there was absolutely no trace of burning. Productions of this character cannot be explained except on the basis that these fakirs are in possession of secrets, centuries upon centuries old, which tradition has brought down in the various religious orders. Soliman Ben Aissa belongs to the order of the Saadi, which was founded by Saadeddin Dschebari in 1335. —*Post-Dispatch.*

THE EDITOR.

The School-Book Question.

State Supt. Vories recently wrote the following letter in answer to a question by a County Superintendent:

In your favor of recent date you say: "Our County Board decided to adopt a Grammar to be used in Sixth Year of the Course of Study, providing it would make no difference with the Indiana School Book Company. I cannot see how it will interfere in the least. What is your opinion? Should we do it, or try to get along with the two adopted books?"

In reply I would say that the action which your Board decided to take is not only unwarranted by the law, but directly in conflict with the law. Moreover, it is directly in conflict with the contracts which the State has with the present contractors to furnish School Books.

So much of section 4436 as relates to the adoption of books by the County Board of Education is repealed by the School Book Law of 1889 and the Supplemental Act of 1891. There seems to have been some doubt in the minds of the legislators of 1891, as to whether or not the act of 1889, made the prohibition of the use of other books than those adopted by the State, strong enough, and so the legislature of 1891 put in Section II of the Supplemental Act, which is as follows:

"Sec. II. The books which have been, or may hereafter be adopted by the State of Indiana for use in its common schools by virtue of this Act, or the Act mentioned in Section One hereof, shall be uniformly used in all the common schools of the State, in teaching the branches of learning treated of in such books, and it shall be the duty of the proper school officers and authorities to use in such schools such books for teaching the subjects treated in them."

The Legislature had in mind two main purposes in framing the School Book Law—uniformity as to price and books, and cheapness. To hold that there is any power left in the County Boards of Education, or City and Town School Boards, so far as the common school books are concerned, to adopt any other book or books than those adopted by the State, would be to defeat the law entirely and to expose the people of the State, to high prices, frequent changes, want of uniformity, and all the other evils which caused the School Book Law to be enacted.

Below I quote from Supreme Court opinion, written by Judge Elliott, in 122 Ind. 462:

"Section one constitutes the State Board of Education Commissioners for the purpose of making selections of text-books for use in the common schools, and designates the standard which shall guide the Board in the selection of books."

"Every provision indicates an intention to establish a uniform system, and not a provision indicates an intention to put it in the power of any officer to break the uniformity."

"Nor is there a word from which it can be inferred that the Legislature intended that inferior school officers might exercise discretionary power and thus break and deform the uniformity and symmetry of the system."

"Two things are very clear, one, that the Legislature meant to provide an exclusive privilege in order to secure books at the best prices; the other, that the Legislature meant to prevent the possibility of any break in the uniformity of the system framed by the statute.

"We accept as correct the assumption of the appellant's counsel, that the statute does require the people of the State to buy the particular books designated by the proper officer, in obedience to the command of the law, and that, so far as concerns the officers of the State, they must be bought from the firms to whom the State Board of Education awards the contract. We agree fully with appellant's counsel upon this point, for we think that everywhere throughout the statute is manifested the intention to create a uniform system, and to make a body of rules which all school officers are bound to obey."

"It was, too, the intention of the Legislature to equalize prices; to prevent one locality from being compelled to pay a much greater price for books than another; to put it beyond the power of the local officers to mar the uniformity of the system; to prevent favoritism and to open the field to competition. To this end the Legislature constructed a system which required competitive bidding, and, to make sure that the best prices might be obtained, provided that whoever secured the contract should have the exclusive privilege of furnishing to the school officers all the books designated and required by the State Board. To permit the local school officers to treat the provisions of the statute as the grant of a privilege would prevent the attainment of this end. To give effect to the intent of the Legislature and to secure the accomplishment of the principal object of the statute it must be held that its provisions create a legal duty which the trustees cannot put on or off at pleasure. To hold otherwise would effectually destroy the symmetry of the statute and so cripple its machinery as to render it useless, and this we cannot do in the face of the historical facts which were laid before the General Assembly by the Governor, considered in the reports of the committees of that body and debated by its members. We know as a matter of history, imparted to us by the most authentic records and in the most public method, that, with little diversity of opinion, it was agreed that there were great evils to be remedied. The difference of opinion was not so much as to the existence of the evil and the necessity of a remedy as it was respecting the nature of the remedy that should be resorted to for the cure of the evil."

The subject-matter in the two adopted Grammars should be so adapted, and set out in the school manual, as to meet all the requirements of language and grammar.

Model Lessons.

Some of the friends of THE STUDENT have suggested that each number should contain a Model Lesson.

It is the desire of the managers of this magazine to give whatever is most helpful to its readers, and they would gladly supply model lessons, if it were thought wise to do so. But there are two objections to the model lesson as commonly presented.

Experienced teachers do not need anything of the kind. They can do more with *suggestive* articles; those that present the main points of a subject,

and leave to the teacher some scope for his originality in the presentation of the subject and in working out the details to suit the especial needs of his school.

Inexperienced teachers, by using model lessons, become machine-like mechanical, and helpless. The model leaves nothing for the teacher to do. He learns to depend upon it. If he uses it exactly as it is given, the recitation is lifeless and uninteresting, pupils and teacher both being mere imitators. The necessity for invention being removed from the teacher, he fails to develop his powers in teaching.

On this account, we deem it unwise to give model lessons frequently. Occasionally one shall be presented in THE STUDENT, but generally we shall try to give food for thought and leave the teacher to assimilate it.

The Schcol.

The one event of the month was the dedication of the new Chapel on the evening of May 10th.

The following is the programme of exercises:

Piano Solo—Ballade, Henri Ruifrok
Quartette—O, Hear us, ye Free,
Misses Grace Groth and Jennie Thatcher, Messrs. R. A. Heritage and J. B. Showalter.
Violin Solo—Concerto Op. 76,
Maggie White
Vocal Solo—My Arm Chair,
R. A. Heritage
Address, Gov. Ira J. Chase
Vocal Solo—Cavatina, from Semiramide
Mrs. M. E. Bogarte
Address, Hon. H. D. Vories

Impromptu speeches were made at the conclusion of the set programme by Hon. H. G. Thayer and Senator Reeves of Plymouth Ind, and G. P. Haywood of LaFayette.

* * *

The occasion was a notable one, and remarkable when compared with the first chapel exercise held by the school less than 19 years ago where, in a little hall of a seating capacity of 300, the 25 students present were lost in a wilderness of vacant seats. Now the finest hall in Indiana, with a seating capacity of 2500, hardly seems adequate to the wants of the school.

* * *

Among the visitors present at the dedication were Hon. H. G. Thayer, Senator Reeves, Supt. S. S. Fish, and Sam Parker, of Plymouth; A. R. Hardesty and A. Bowser of Chesterton; J. M. McGill, Mrs. Kate Durand and Prof. J. N. Roe, of Chicago; C. M. Eby, Supt. Frank Cooper, Dr. Benton Brown, G. P. Haywood, Arthur Pearce, Dr. Jos. Carson and Dr. Putnam.

* * *

The building is a massive structure of pressed brick, trimmed with Bedford stone, and is a credit to the "Hill" and city. It was almost exactly a year in building and contains 4 excellent recitation rooms and THE STUDENT'S office on the first floor, the entire second story being given to the Hall.

The Crescent.

Instead of the regular program, April 29, the school was entertained by the DePauw Quartette, assisted by Clarence Hough, the humorist. It was considered a rare treat by the audience. The Quartette and Mr. Hough were repeatedly recalled by enthusiastic encores.

The Crescent gave one of the most interesting programmes of the year, May 20. One of the chief features of the evening was a talk by Miss Baldwin. Her story of her trip to Quebec was highly appreciated by the audience.

P. M. Hoke has been teaching in this county the past eight months. His school having closed, he is attending the Normal. He will take the Scientific Course next year.

Miss Edna Landis, a teacher of this county, has finished a successful term of school.

May 27th, the Crescent gave their program in the Chapel. An enthusiastic audience listened to some interesting remarks about "Seals", by Prof. O. P. Kinsey. J. C. M.

The Star.

O. W. Storer is in school again after a winter's term of school near his home in Delaware Co., Ind.

The program for the eighth meeting of Star was omitted on account of the entertainment given in the New Chapel by the Lotus Male Quartette, of Chicago, under the auspices of the Junior Law class.

Miss Maggie Harper has returned and is again at work in school, much benefitted by several weeks' rest.

Miss Rebecca Volkee was obliged to leave her work in the State Normal at Mayville, S. D., on account of ill health, and is at her home in Valpo.

Miss Myrtie Landis has just completed a nine months' term of school in Porter Co. Ind. She and her sister, Edna, will leave about June 1st, for a two months' visit in Virginia.

Miss Matie McDonald of '90 and '91, is assisting J. H. Wright, a Scientific of '91, in a Summer Normal at Albany, Ind. She teaches Elocution and also has charge of the primary work.

Miss Sarah Ream returned from Atlanta, Ga., May 5, and will continue in school the rest of the year. She was very much pleased with her work and the "Sunny South", and will next year return as a member of the Faculty of the Clarke University.

WHAT THEY ARE DOING.

J. W. McCaslin has been re-engaged as principal of the Poneto, Ind., school.

A. H. Barber conducts an 8 weeks' Normal at Walkerton, Ind,

J. A. Alexander is enjoying merited success in his Normal at Odon, Ind.

Mary Gault will spend the summer vacation at her home in Cincinnati, Ia.

Ada Carr, Scientific of '86, is teaching in Osborne, Kan.

Mr. and Mrs. C. M. Jansky have been engaged to teach next year in the Bloomfield, Iowa, Normal School.

Messrs. Newsom and French hold a Summer Normal in Marion, Illinois. Their school began April 25.

Geo. Lacure has been retained another year in his school in GenesseCo., Mich., at an increased salary.

Walter H. Evans finished a very successful year's work in the Magnolia, Ill., school May 6.

I notice among the professional cards in an Adair, Iowa, paper, that of F. E. Gates, Attorney at Law.

H. S. Parsons is the President of the South Western Normal College, and is making a great success of it.

J. W. Kitch has been re-elected principal of the Adair, Iowa, school at an advanced salary.

Ida Barnett who was here last year will be in school again during the summer.

G. A. Hawkins closed his school in Hebron, Ind., May 27. He is one of the most popular teachers in this county.

The Winslow Normal, under the able management of Sylvester Thompson, closed with appropriate exercises May 27th.

I have a circular announcement of a Summer School of Elocution to be held in Westminster, Md., by T. A. Austin, of the Elocution class of '80.

Olof H. Green has secured a pleasant and profitable position in the office of the U. S. Commissioner of Railroads, Washington, D. C.

A. L. Moore has recently located in Fargo, N.D., as state agent for several life insurance companies. He is doing well.

A. A. Quinlan of '90, has closed a very pleasant and successful term of school in Texas, and will spend the summer vacation at his home, College Mound, Mo.

T. J. Stoetzel, for several years a County Superintendent in Nebraska, announces his intention of returning to school to make a specialty of mathematics.

A very handsome programme announces the close of a successful year's work by D. B. Flickinger at Webster, S. D. Mr. Flickinger has been offered the same position another year.

R. B. Daniel has so pleased the patrons of the Dows, Iowa, school that he has been given an assistant principal, and retained another year at an increased salary.

G. M. Billmeyer has been offered a position in a Missouri Normal for next year and, much to the regret of the citizens of Volga City, will probably accept. He is a good teacher.

A. J. Healy writes from Greenwich, O, that he has finished a pleasant term of seven months in Florida, and hopes soon to enroll himself here as a student. He will be welcome.

It is with great sorrow that I announce the untimely death of Mrs. H. C. Faber of Tulare, Cal. Mr. Faber was a member of the Classic class of '80.

A. F. Heltman has been elected principal of the schools of Denton, Tex., at an advance of $20 per month in his salary. He is pleased with his work and location.

Wm. Millard is traveling for a Chicago firm, and Lydia, (Mrs. Murane) writes a pleasant letter from North Yakima, Washington, where Mr. Murane has opened a law office.

Miss Louisa A Boyakin of '80 is finishing her 7th year's work in the public school of Millstadt, Ill. with the assurance from the Board that the position is hers as long as she cares to fill it. Well done.

G. P. Gadbury and Lura Robb, both of whom have many friends among you, were married at Shumway, Ill., May 5. They will return to Texas in August, where Mr. Gadbury will continue teaching.

L. M. Conn of Gibbon, Neb, writes, —

I consider THE STUDENT almost as a visit to the Normal, as I find out where a great many of my acquaintances and class mates are located, and what they are doing. School is moving along nicely here.

I had a pleasant call May 25th from Oscar Hale, Scientific of '86. He has been teaching in Holton, Kansas, for the past four years and has given such good satisfaction that he has been elected superintendent of the Holton schools for next year at a salary of $1000.

Prof. W. J. Hussey, who prepares the excellent notes on Astronomy for THE STUDENT, has received the appointment of Prof. of Astronomy in the Leland Stanford Jr. University. He will assume his duties about August 1. THE STUDENT extends its warmest congratulations to Mr. Hussey on this recognition of his well known ability.

Among the exchanges that come to my table is *The Tribune*, of Pullman, Wash., J. J. Murray, of '90, editor. Mr. Murray writes, —

I have been in the North-west ever since leaving school. I taught two successful terms of school, and at the conclusion of the second, I accepted a position on the Spokane Daily Chronicle as traveling correspondent. After working at this for seven months I settled down and started a paper of my own, and am succeeding well. The many friends of Miss Mildred Meyers will be pleased to know that she is now Mrs. Moore, she having been married last fall.

Miss Neva Hunt, whom so many of you know, writes the following kind letter:—

Whenever I receive THE STUDENT, I seem to have met an old friend, and I feel as though I ought to write you a few lines in acknowledgement of the enjoyment and benefit derived from reading its pages. I hardly can tell what part of it I like best. I usually read the notes concerning old friends first, but am very much interested in every department of it, and would find it difficult to get along without it.

I am very busy at present: I teach school through the week, while my evenings and Saturdays are employed in giving private lessons in Elocution. Several have already asked me to organize a class again during the summer vacation. Two of my pupils recited at an oratorical contest of the township schools last week; both were successful; one being first in High School grade, and the other first in the Grammar grade. I very much enjoy teaching elocution, and am greatly interested in my pupils. With best wishes for the success of THE STUDENT.

PUBLISHER'S PAGE.

THE STUDENT.

M. E. BOGARTE, EDITOR.

H. N. CARVER, MANTIE E. BALDWIN,
ASSOCIATE EDITORS.

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AMONG THE MAGAZINES.

The POPULAR SCIENCE MONTHLY for June is a fine number of this excellent journal. The POPULAR SCIENCE is doing a great work in the right direction, and should be read by every student.

The ATLANTIC MONTHLY for June contains a paper of great value to teachers and to all persons who are interested in one of the greatest problems of our day —The Negro Question. This is the article by *William T. Harris* LL. D., U. S. Com. of Education, entitled *The Education of the Negro.*

The June OVERLAND MONTHLY contains an interesting account of a trip just made to the Great Crater of Kilauea, down into the pit, and out on the crust. The article contains an explanation of the eruptive cycle of Kilauea, based on scientific investigations, and recast in a clear and readable manner.

Three notable and instructive papers in THE CALIFORNIAN for June are a Review of the *Fur-Seal Controversy*, the first installment of *Shall We Educate our Politicians*, by Casper T. Hopkins, and the second installment of *Some American Glaciers.*

With the May number THE ARENA closes its fifth volume, the great review now being just two-and-a-half years old. Since Nov. last its subscription list has increased a little over thirty-three and one-third per cent.

The May number of THE COSMOPOLITAN under the joint editorship of W. D. Howells and J. B. Walker is a superb issue, far in advance of the already high standard maintained by this beautiful publication.

The LADIES' HOME JOURNAL for June is on our desk and is, as usual, full of articles well calculated to please the ladies. It is essentially what its name suggests—*a home journal.*

The sensible, incisive comments of Walter Blackburn Harte, *In a Corner at Dodsley's*, are becoming a feature of THE NEW ENGLAND MAGAZINE. One is getting to turn instinctively to this corner before cutting the leaves of the fresh number. A valuable paper in the June issue is *The Christian Endeavor Movement*, a history of the past and prophecy for the future of this modern movement.

Prof. Charles E. Fay who tells the readers of the June WIDE AWAKE *Why the White Mountains are called White*, is one of the faculty of Tufts College and a leading spirit in that coterie of mountain climbers, the Appalachian Club.

APRIL EXAMINATION QUESTIONS FOR INDIANA.

READING.

"It is not work that kills men; it is worry. Work is healthful You can hardly put more upon a man than he can bear. Worry is rust upon the blade. It is not the revolution that destroys the machinery, but the friction."—*Beecher.*

1. (a) Define the logical faculty of the mind. (b) Show how the above selection cultivates that faculty.
2. Why is it important that this faculty be cultivated?
3. Give five questions showing your method of bringing out the meaning of the above selection.
4. State your method of teaching beginners in reading, basing it upon the fundamental principles, "from within out."
5. Read a selection.

ANSWERS.

1. The logical faculty is the faculty which enables us to get new knowledge from old. In the extract given the new knowledge is, "that work does not kill." It is obtained in some such way as the following:—Whatever is healthful does not kill; work is healthful; then, it does not kill. The only doubt about the conclusion, arises from the doubt about the truth of the second proposition,—does it mean *all* work or only *some*? If the latter, then we do not know whether the conclusion is true or not. It is not knowledge, but only possible knowledge. The other sentences of the extract are designed to show that the term "work" in the second proposition means all work, for evidently that is what is demanded in the conclusion,—whatever kills is not work. The last sentence undertakes to tell us what it is that kills. An engine is destroyed by friction, by energy expended in such way as not to reach the purpose for which the engine works. What is friction in the engine, is worry in the mind; then, it is worry that kills. The reasoning is analogical.
2. The faculty should be cultivated, because without it no new knowledge could be obtained, and without new knowledge there is no progress, no improvement, no life, only death. It should be properly cultivated, because new knowledge that is not truth, may be worse than the old knowledge, it may hasten the death.
3. Pupils of average intelligence will probably understand the selection, so no questions are necessary. You might have the pupils tell of the correspondence between rust on bright steel and carking anxiety, how friction symbolizes worry, etc.
4. The object of all reading is to awaken thought. To beginners in reading an object is presented in order to arouse thought in their minds. Naturally this leads to the presentation of the name of the object; then to things that may be said of the object, thus introducing sentences. The sentences thus framed by the pupils are, by the teacher, written upon the board and read by the pupil.

ARITHMETIC.

1. $(18\times2+24\div3)\div11\times2+8-16\div4=$?
2. Show how addition of compound numbers is related to addition of simple numbers.
3. Upon what three principles is the greatest common divisor based?
4. Fnd the G. C. D. of $\frac{3}{4}$, $\frac{5}{8}$, $1\frac{7}{2}$.
5. How much money must be invested in 3% Consols, when they are 10% below par, in order to produce an income of $2,000 a year?
6. In a dormitory $1\frac{1}{2}\frac{1}{3}$ of the boys are in the upper school, $\frac{2}{3}$ of the remainder in the middle, and the rest, 8 in number, in the lower. How many boys in the dormitory?
7. By selling a house for $3,700 I lost 7½%; what ought I have sold it for to have gained 12½%?
8. How many bricks, 9 inches long, 4½ broad, and 2 thick, will be required for a wall 60 ft. long, 20 ft high, and 4 ft thick, allowing 6¼% of the space for mortar?
9. If arithmetic is a science, should evolution be taught geometrically (that is by the use of blocks), or as the inverse of involution?
10. A log of timber is 18 ft long, 1 ft. 4 in. wide, and 15 in. thick If a piece containing 2½ solid ft. be cut off the end of it, what length will be left?

ANSWERS.

1. $(18\times2+24\div3)\div11\times2+8-16\div4=$
   $(36+8)\div22+8-4=\frac{4}{2}\frac{4}{2}+8-4=2+4$, or 6.
   * See discussion of this problem below.
2. The principle in adding compound numbers is the same as that of adding simple numbers, but the scale in simple numbers is 10 (*i. e.*, 10 units of any order make one of the next higher) while the scale in compound numbers varies, except in the case of U. S. money, where it is uniform, and is 10.
3. (a) Each remainder is a *number of times* the greatest common divisor.
   (b) A remainder cannot exactly divide the previous divisor unless such remainder is *once* the greatest common divisor.
   (c) Hence, the remainder which exactly di-

vides the previous divisor, is *once* the greatest common divisor.

4. Greatest common divisor of 3, 5 and 7 is 1. Least common multiple of 4, 8 and 12 is 12. ∴ G. C. D. of ¾, ⅝ and $\frac{7}{12}$ is $\frac{1}{12}$. Ans.

5. Let 100% = par value.
   3% = $2,000
   1% = $666⅔
   90% = $60,000. Ans.

6. $\frac{2}{3}$ = the whole number.
   $\frac{2}{3} - \frac{1}{3} = \frac{1}{3}$.
   $\frac{2}{3}$ of $\frac{12}{3} = \frac{8}{3}$, no in middle school.
   $\frac{11}{3} + \frac{8}{3} = \frac{19}{3}$, no. in upper and middle.
   $\frac{23}{3} - \frac{19}{3} = \frac{4}{3}$ no. in lower.
   ∴ $\frac{4}{3} = 8$
   $\frac{1}{3} = \frac{1}{4}$ of 8 or 2.
   $\frac{23}{3} = 23 \times 2$ or 46, the no. in the whole dormitory.

7. Let 100 per cent = cost of house.
   7½ " " = loss
   92½ " " = $3,700, selling price.
   1 " " = $\frac{3}{185}$ of $3700, or $40.
   112½ " " = 112½ × $40, or $4500. Ans.

8. A wall 60 ft. long, 20 ft. high, and 4 ft. thick contains 4800 cu. ft.
   100% = 4800 cu. ft.
   1% = 48 " "
   6¼% = 300 " ", the mortar portion.
   4800 cu. ft. — 300 cu. ft. = 4500 cu. ft. the brick portion.
   A brick 9 in. long, 4½ broad, and 2 thick, contains 81 cu. in.
   4500 cu. ft. = 1728 × 4500 cu. in., or 7776000 cu. in. Now, there will be as many bricks as 81 is contained times in 7776000, or 96000. Ans.

9. As the inverse of involution.

10. A log 18 ft. long, 1 ft. 4 in. wide, and 15 in. thick contains 30 cu. ft.
    30 cu. ft. requires 18 ft. in length.
    1 " " " $\frac{1}{30}$ of 18 ft. or $\frac{3}{5}$ ft.
    2½ " " " 2½ × $\frac{3}{5}$ ft. or 1½ ft. in length.
    18 ft. — 1½ ft. = 16½ ft. Ans.

GRAMMAR.

1. State the difference between a conjunction and a preposition.

2. How are adverbs compared? Illustrate.

3. What is the object of each of the prepositions in each of the following: Will you go with me into the garden? He arrived before we left. The Rhone flows out from among the Alps.

4. Show by examples and explanations the difference between the prepositions "between" and "among."

5. State what relation is expressed by each conjunction in the following: The day is chilly, because the wind is blowing hard. The ground is wet, therefore it must have rained last night.

6. What is the value of parsing?

7. Correct these sentences, giving reasons:
   a. His act was despisable.
   b. He was very bunglesome in his work.
   c. He don't take pains in his writing.

8. Correct this sentence, and then analyze it: Her beauty, and not her talents, attract attention.

ANSWERS.

1. A co ordinate conjunction unites similar elements. A preposition joins an object to an antecedent and is always a relation word.

2. Regularly and irregularly; as, still, stiller, stillest. Faithfully, more faithfully, most faithfully.

3. "Me" is the objeet of "with," "garden" the object of "into." "Before" is a conjunction and joins the clause "we left" to "arrived." "Alps" is the object of "out from among." This may also be considered in another way, —"from among the Alps" being the object of "out," and "Alps" the object of of "from among."

4. "Between" is used with reference to two objects; "among" with reference to a greater number; as, "The apples were divided between the two boys." "The apples were divided among the children."

5. "Because" shows a relation of reason. "Therefore" shows a relation of supposition.

6. Parsing is the best means of directing a pupil's thought to a particular word in a sentence, which, if understood, will convey the idea intended. Parsing is really analyzing, because it is impossible to parse a word without analyzing the sentence, so that in reality it includes all that is necessary in this part of grammar.

7. a. His act was despicable.
   b. He was very awkward in his work.
   c. He does not take pains in his writing.

8. Her beauty, and not her talents, attracts attention. This is a compound declarative sentence, of which "her beauty attracts attention" is the first member, and "her talents do not attract attention" is the second member. Both are simple sentences. "Beauty" is the subject of the first, modified by "her," an adjective element; "attracts" is the predicate modified by "attention," as an object. The same analysis for the second member.

PHYSIOLOGY.

1. Define anatomy, physiology, hygiene and histology.

2. Name five kind of tissue, and tell where each is found.

3. Name the kinds of joints, and give an example of each.

4. Name five digestive fluids, and state the kinds of food upon which two of them act.

5. What is meant by the oxygenation of the

blood? How and where is the process carried on?

6. State the principal rules of hygiene whose observance will preserve a healthy digestion.

7. What is a stimulant? A narcotic? Name two of each.

8. What diseases are apt to attack the respiratory organs? How may they be provided against in the school room?

ANSWERS.

1. Anatomy is the science of the structure of organisms.

   Physiology is the science of the functions of organs and tissues.

   Hygiene is the art of the preservation of health.

   Histology treats of the minute anatomy of organisms.

2. (1) Epithelial, found as membranes covering the body and in intestines.
   (2) Connective tissue, found throughout the body connecting other tissues.
   (3) Nerve tissue, in the brain and spinal cord.
   (4) Muscle tissue, in the muscles.
   (5) Areolar tissue, a kind of connective tissue.

4. (a) Hinge joint, the knee. (b) Ball and socket joint, the hip joint. (c) Pivot joint, articulation between the radius and humerus. (d) Compound joint, the wrist joint.

5. Saliva, acts upon starch. Gastric juice, acts upon proteids. Bile, acts upon oils and fats. Pancreatic juice acts upon oils, fats, and proteids. Succus entericus, acts on all food stuffs.

5. The exchange of CO_2 from the tissue changes in the capillaries for oxygen. Oxygenation is carried on in the pulmonary capillaries.

6. Eat slowly, masticate food well, be cheerful, give time for digestion.

7. (a) Whatever tends to exalt the bodily functions. (b) Whatever tends to depress the bodily functions. (a) Alcohol. (b) Tobacco.

8. Consumption, Bronchitis, Pleuritis, and Pneumonia. By a proper regulation of temperature, ventilation, and cleanliness.

HISTORY.

(*Answer any seven.*)

1. Give an account of the founding of two of the four Colleges first founded in America.

2. Give an account of the settling of Georgia.

3. What seems to you the one element in the character of William Penn that was of most service to the colonies he founded.

4. What region of the United States has produced the highest type of literary work? How do you account for this?

5. At what time in the history of the United States has public sentiment made its most rapid changes on great political questions? Explain.

6. At what times and in what regions of our country has the right of secession from the Union been claimed or threatened? Explain the cause in each instance.

7. Name the large acquisitions of territory made by the United States within this century, and tell how each was acquired.

8. Name three settlements, differing radically in the class of people by which they were made. In how many of these three regions are still noticeable any social or political characteristics that have descended without much change from the original settlers? Explain what they are.

9. Name five men who, each in a different way, have turned the course of United States history from what it would probably have been otherwise. Explain what each did.

10. Mention the two inventions that, in your estimation, have most changed the course of history in this country from what it would probably have been otherwise.

ANSWERS.

1. Harvard College was established at Cambridge, Mass., in 1636, seven years after the establishment of the Massachusetts Bay Colony. The courses of study were chiefly literary, Latin, and Greek. It was sustained entirely by the colonies, once, at least, each family giving twelve pence, or a peck of corn. The college of William and Mary was established at Williamsburg, Va., in 1692, eighty-five years after the settlement at Jamestown. It received its charter from the English government, and many favors in addition. The courses embraced divinity, language, and natural philosophy. Its charter stated that it was founded, "to the end that the Church of Virginia may be furnished with a seminary of ministers of the gospel."

2. Georgia was settled in 1733 by Gen. James Oglethorpe, who had become much interested in the poor and debtor classes of England. The settlement was made where Savannah now stands. Though Oglethorpe had a royal title to the land, he paid the Indians for it, and they were always friendly to him. He would not allow slavery to be introduced into the settlement. The institution was finally introduced largely through the influence of George Whitefield, an associate of John Wesley in establishing the Methodist church.

3. His belief that the Sermon on the Mount contains some good political philosophy.

4. New England.—The inhabitants have always been men of good ability, physically, mentally, and morally; and have consequently thought that life is worth living because it is serious.

5. From 1860 to 1865. Before that time they had no sure conviction as to the meaning of their constitution. During that period events compelled them to find out.

6. From 1832 to 1861 it was the general political creed of the cotton states; sporadically, it has probably been held in all.

7. Louisana purchased from France in 1803 for $15,000,000; Texas annexed in 1846, the government assuming its debt of $7,500,000; New Mexico and California in 1848, the government paying Mexico $15,000,000 and assuming the debts due citizens of the U. S. from Mexico amounting to three or four millions.

8. Massachusetts, Pennsylvania, Virginia. Yankee shrewdness, Quaker staidness, and cavalier hospitality.

9. The question probably implies what never occurred. The course of history is never turned very much from its course by any one man. If any particular man were not found to fill a given place in the course of things, another would be found. Washington, Monroe, Webster, Lincoln, and Grant would, perhaps, represent what the question implies.

10. The steam engine and the telegraph.

DAVID COPPERFIELD.

1. David Copperfield is regarded as (in part) an autobiographical story. Note the principal parallelisms in the lives of the hero (Copperfield) and the author.

2. Sketch, connectedly, the career and character of Mr. Micawber.

3. Besides the two already mentioned, name the half dozen leading characters in the story, and give reasons for your selection.

4. What insight into English business is afforded by the story?

5. Trace the steps in David's education, and note its extent and efficiency.

6. Sketch and compare the characters of Dora and Agnes.

ANSWERS.

1. Many incidents in Dickens' early life are pic tured in David Copperfield. Dickens' childish fondness for several old works of fiction are shown in David's childhood. Dickens' leaving, at nine years of age, his childhood's home in Chatham is protrayed in David's leaving his home to go to work, after his mother's death. Dickens' early impressions of London, his father's incarceration in Marshalsea Prison, are all pictured in David's career while working at Murdstone and Grinby's and in his first experiences with the Micawbers. One of the schools attended by Dickens is pictured in Salem House in "David Copperfield". His experience as reporter is shown in David's. A real Dora influenced Dickens' early years somewhat as David's Dora did his early manhood.

2. Mr. Micawber was generous, kind, impulsive, improvident, and weak in many things, but noble in heart. He first appears in the story as we see him all through, "waiting for something to turn up." He was David's friend when David was enduring hardships at Murdstone and Grinby's. He was imprisoned for debt in King's Bench Prison; was released and went to Plymouth in the vain hope of securing employment in the Custom House. He returned to London again vainly to seek refined employment. He fell into the power of Uriah Heep, but ultimately assisted in bringing that villain to justice. He was finally assisted to go to Australia where he became a worker in earnest.

3. Dora, David's lovely child-wife, who developed his power of self-dependence. Agnes, his good angel, who always influenced him and aspired him to the highest that was in him. Peggotty, his faithful friend through all the ills of his life. Betsey Trotwood, his eccentric but noble aunt. Steerforth his bad angel. Uriah Heep, the villain of the story.

4. Some idea is given of the difficulties in the way of people's securing important positions in business; also of doing business as Mr. Spenlow did, by apparent proxy. Numerous other instances are found among the occupations of the minor characters.

5. David's education was rudimentary. He grew and developed from his experiences. His learning gained in school, as at Salem House and Dr. Strong's, was helpful, but not as much so, as that gained by his own keen observation and his quickened sensibilities. His education entire made him able to turn to many things to earn his living, and yet developed most fully his talent as a writer.

6. Dora was a lovely, spoiled, petted child, affectionate, dependent, and thoroughly lovable, but unable to be or do aught to help David. Agnes was beautiful, strong, self-reliant and helpful; a woman to be loved and trusted; a guide and helper always to those needing help; the one woman to fill out and complete the incompleteness of David's later, stronger manhood; the dear presence without whom he was as nothing.

SCIENCE OF EDUCATION.

(*Answer any five.*)

[These questions are based mainly on the Reading Circle work for the current year.]

1. What important changes has public thought undergone in the last twenty five years, in regard to fitness for teaching ?

2. What do you consider some of the most important natural qualifications for the work of teaching?

3. What general fields or departments of study do you think a liberal preparation for teaching ought to include?

4. Show why you would have such a course of preparation include the lines of study you name in answer to question three?

5. What is meant by teaching power?

6. What advantages result to a person from the study of a history of his profession?

ANSWERS.

1. The art of teaching has developed much, and the demand for real teachers is much greater than it was twenty-five years ago. Proper methods are much better understood and appreciated, chiefly because the greater demand and consequent better wages have induced a greater number of really able men and women to give a larger part of their lives to the work.

2. Good thinking, good feeling, and, consequently, good willing, all within the sphere of the teacher's work. The qualifications of a good teacher are not different from those of a good lawyer, or good doctor, or good merchant in his own proper sphere.

3. The branches to be taught, and so much of the outlying fields of knowledge as the teacher can enter honestly.

4. The teacher's work cannot be *thorough*, but it can be *thorough going*, and must be so to be good. Now, there is no branch which does not in some way touch all others, enter in in some way into the fields of all others. So, it would be well for the thorough going teacher to know so much of these as his opportunities may permit.

5. The power of getting the pupils to have the clearest and distinctest view of any subject; and of knowing how to improve for themselves this perfectness of knowledge; and, finally, of loving such perfectness of knowledge.

6. "History is philosophy teaching by example." The teacher's work is an organic work as much as any other kind of work is; and if the teacher is to be master of his work, he needs to know what his position in the organic series is, as much as the physician, or lawyer, or theologian does.

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* Discussion of problem 1.

In the first part of the problem we have

$$(18\times2+24\div3)=44\div11\times2, \text{ etc.}$$

Now, $44\div11\times2$ gives rise to the question whether we shall divide by 11 and multiply the quotient by 2, or whether we shall divide by 22. Surely *both* cannot be correct, and yet authority may be quoted on either side.

Now, if we had $44\div22$ no one would hesitate to give the correct result, and there *could* be no difference of opinion. A learned author says the signs of multiplication ($\times$) and division ($\div$) should be taken in the order in which they occur; but why this order here, when the algebraic usage – and an unquestionable one—overrules it, giving the sign of multiplication precedence over *all* others? Besides 11×2 not only equals 22 but it presents 22, *and nothing else*, to the mind. 11 and 2 are factors, which are much more closely related than terms. It was to bring terms into this close relation that the parenthesis was first used by the German writer, Albert Girarde, more than two centuries ago. The parenthesis has been used up to the present time to connect *terms*, and to show that these terms are to be considered as one quantity; but this use has *never* been extended to factors, since they are in the closest possible relation, to retain their indentity as numbers. A degree nearer and they pass into the composite number of which they are the factors, losing their identity as drops of water disappearing into a larger quantity, still a part but not a distinct part.

Again, $44\div21=44\div11\times2$; and, if 11×2 presents identically the same thing to the mind as 22, that is, if 11×2 presents 22 to the mind, then the interpretation must be the same, and hence, the same result. J. B. S.

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